THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXXVIII. No. 2170.] LONDON, DECEMBER 13, 1904. [56TH YEAR. PRICE 6d.

PARKER & LESTER,

— ESTABLISHED 1830. —

MANUFACTURERS AND CONTRACTORS, **ORMSIDE STREET, LONDON, S.E.**

THE ONLY MAKERS OF

PATENT ANTIMONY PAINT & PARKER'S IMPERIAL BLACK VARNISH.

OXIDE PAINTS, OILS, AND GENERAL STORES, FOR GAS AND WATER WORKS,

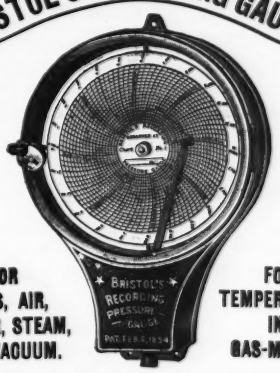
SAFETY GAS-MAIN STOPPER,

FOR SHUTTING OFF GAS IN MAINS TEMPORARILY DURING ALTERATIONS AND REPAIRS.

GAS-LEAK INDICATOR.

PRICES AND PARTICULARS ON APPLICATION.

BRISTOL'S RECORDING GAUGES



FOR GAS, AIR, WATER, STEAM, OR VACUUM.

FOR TEMPERATURE IN GAS-MAINS.

Many Thousands in Daily Operation.

J. W. & C. J. PHILLIPS,
23, COLLEGE HILL,
LONDON, E.C.

All Pipes marked

"S.A.V."

VERTICALLY CAST IRON PIPES.

The only Foundry in Europe casting Pipes under Clarifying Process.

A. G. CLOAKE,

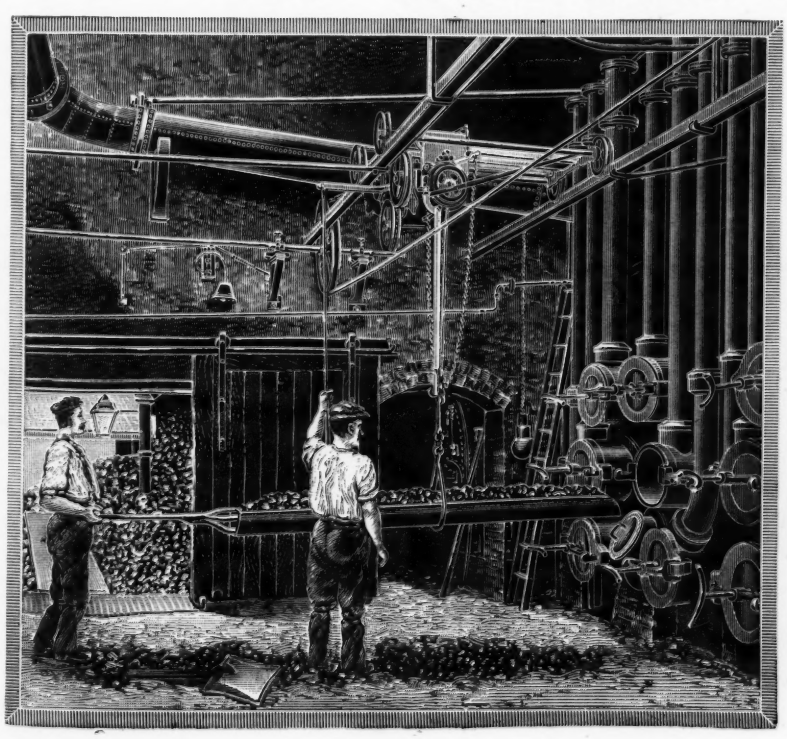
Telegrams: "AMOUR, LONDON."
Telephone Nos.: 1890 HOLBORN; CENTRAL 194.

54, HOLBORN VIADUCT, LONDON, E.C.

BIGGS, WALL, & CO.,

13 CROSS STREET FINSBURY, LONDON, E.C.

Telegrams: "RAGOUT, LONDON."
Telephone: 273 CENTRAL.



"RAPID"
MANUAL & POWER
CHARGING APPARATUS,

FOR GAS-WORKS OF ALL SIZES.

Repeat Orders

YEOVIL, NEWPORT, SOUTHBANK, WORTHING, ALDERSHOT.

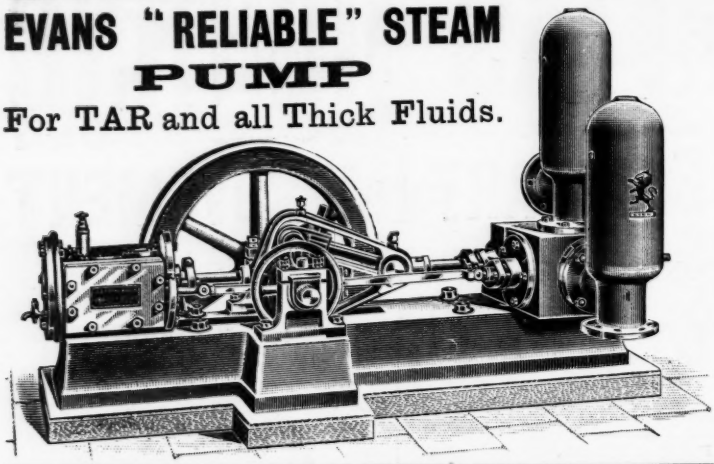
Machines can be seen working at any of the following Works:—

ALDERSHOT	WREXHAM
WORTHING	SWINDON
YEOVIL	EPSOM
TRURO	SHETTLESTON
NORMANTON	DUBLIN
WESTON-SUPER-MARE.	G. S. & W. Rly. Works
GOOLE	NEWPORT, MON.
HARLOW	CLEVEDON

Please do not fail to visit our STAND at the International Gas Exhibition at Earl's Court, W.: Nov. 19 to Dec. 17.

EVANS "RELIABLE" STEAM PUMP

For TAR and all Thick Fluids.



FIRST AWARDS EVERYWHERE.

Write for No. 8 Catalogue.

Telegrams:
"EVANS," WOLVERHAMPTON
National Telephone No. 39.
London Office,
SALISBURY HOUSE, LONDON WALL, E.C.

JOSEPH EVANS & SONS,
CULWELL WORKS,
WOLVERHAMPTON.

PATENT ADJUSTABLE OVERFLOWS.

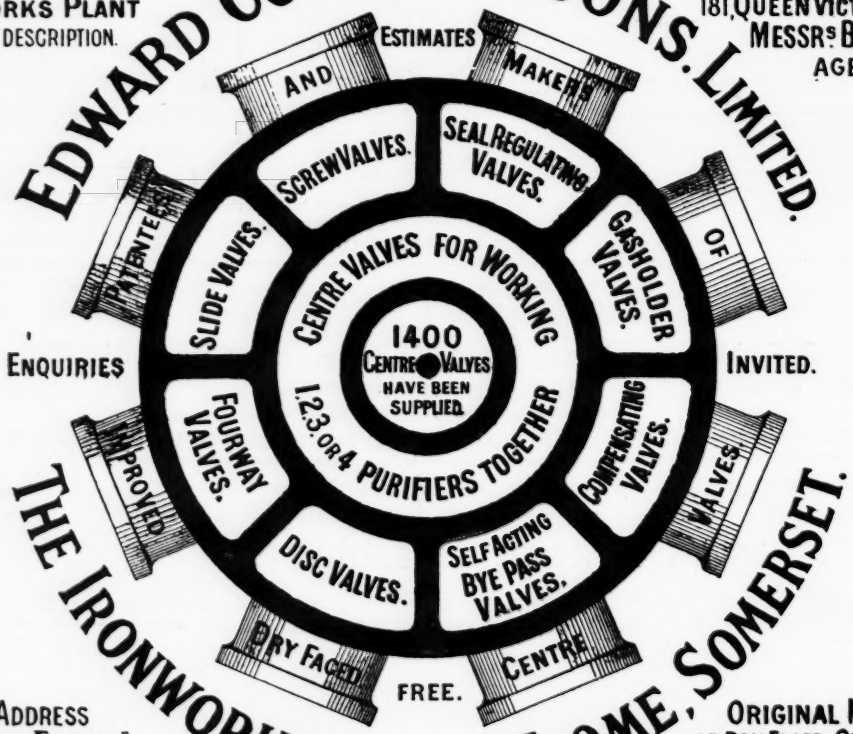
ENGINEERS & CONTRACTORS FOR GAS WORKS PLANT OF EVERY DESCRIPTION.

EDWARD COCKEY AND SONS, LIMITED.

LONDON OFFICE:
BRIDGE HOUSE
181, QUEEN VICTORIA ST. E.C.
MESSRS. BALE & HARDY, AGENTS.

PATENT WASHERS

ENQUIRIES



INVITED.

FREE.

PATENT COMBINED BYE-PASS & COMPENSATOR FOR EXHAUSTERS.

THE IRONWORKS FROME, SOMERSET.

TELEGRAPHIC ADDRESS
"COCKEYS FROME"
"DAMPER LONDON"

ORIGINAL MAKERS OF DRY-FACED CENTRE VALVES.
ESTABLISHED OVER HALF A CENTURY.

PATENT FIRE DOORS & FRAMES.

Every Description of

FIRE-CLAY GOODS
OF BEST QUALITY ONLY.

Personal attention given to all orders.

MOBBERLEY & PERRY,
STOURBRIDGE.

INCLINED AND HORIZONTAL
RETORTS of both Taper and Parallel Sections.
SPECIALS FOR WATER GAS PLANTS.
CHECKER BRICKS ALWAYS IN STOCK.
LARGE STOCKS KEPT.

See our Stands No. 158, &c.

THE BARROWFIELD IRON-WORKS, LTD.,

GAS ENGINEERS AND CONTRACTORS,

GLASGOW.

Telegrams:
"GASOMETER, GLASGOW."

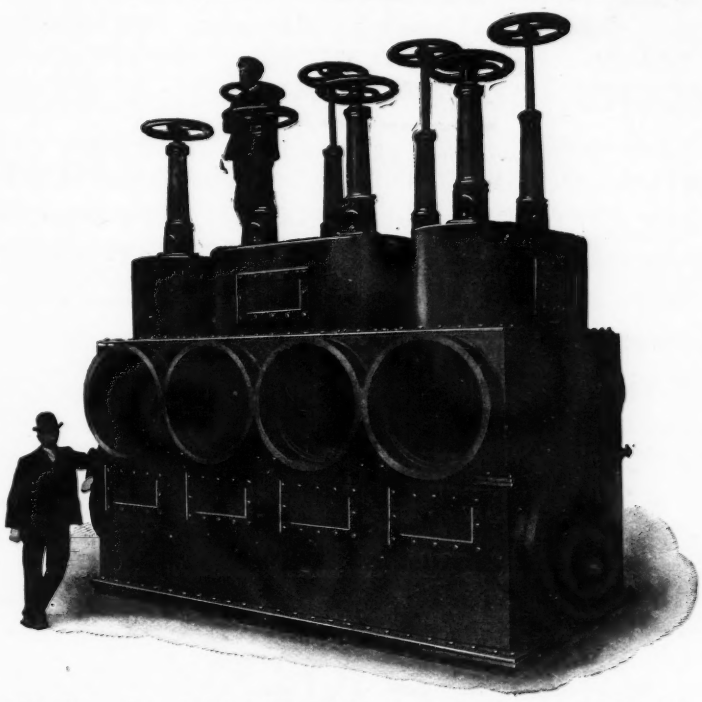
OIL PLANT AND CHEMICAL APPARATUS.

BRIDGES, GIRDERS, WHARVES, PIERS.

ROOFING OF EVERY STYLE.

PIPES, VALVES, AND CONNECTIONS.

London Office:
6, LITTLE BUSH LANE, CANNON STREET, E.C.



Weck's Centre-Valve for 30-inch Connections for GRANTON GAS-WORKS of the EDINBURGH and LEITH CORPORATIONS GAS COMMISSIONERS.

GAS APPARATUS OF EVERY DESCRIPTION.

RETORTS, CONDENSERS, SCRUBBERS, PURIFIERS.

GASHOLDERS AND TANKS.

ENGINES, EXHAUSTERS, STEAM-BOILERS, AND FITTINGS.

GEORGE ORME & CO. (Branch of Meters Ltd.)

ATLAS METER WORKS,

Tel. Address: "ORME OLDHAM."
Telephone No. 93 Oldham.

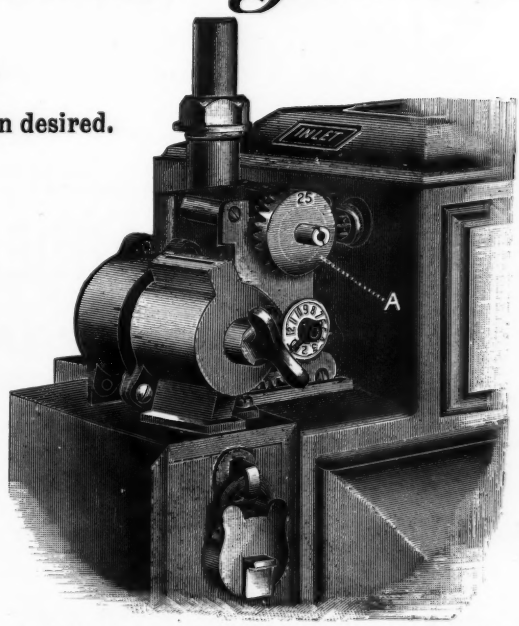
PARK STREET, OLDHAM.

"NEW CENTURY" PATTERN

Patent Coin *Prepayment Gas-Meters*

Fitted with Detachable Attachments.

Arranged for 1d., 1s., or any other Coin desired.



Change of Price effected by simply removing Crown Wheel "A" and replacing same with another Wheel.

ANY FURTHER PARTICULARS WILL BE SUPPLIED UPON APPLICATION.

NEWTON, CHAMBERS, & CO.,

LIMITED,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

Established 1790

LONDON OFFICE: 19, Great George Street, WESTMINSTER.

Telegraphic Addresses: "NEWTON, SHEFFIELD," "ACCOLADE, LONDON."

GAS ENGINEERS, IRONFOUNDERS, & CONTRACTORS.

MANUFACTURERS OF EVERY DESCRIPTION OF

PLANT, APPARATUS, AND MACHINERY FOR GAS AND CHEMICAL WORKS.
RETORTS AND FITTINGS. MOUTHPIECES WITH SELF-SEALING LIDS.
IMPROVED COAL AND COKE HANDLING PLANT, CONVEYORS AND ELEVATORS.
CONDENSERS. SCRUBBERS, AND WASHERS.

PURIFIERS with Planed Joints a Speciality.

PATENT CENTRE-VALVES. RACK AND SCREW VALVES, WOOD GRIDS AND SCRUBBER-BOARDS, CAST-IRON MAINS, AND SPECIALS.
STRUCTURAL WORK, COLUMNS, GIRDERS. AND ROOFING.
GASHOLDERS, CAST-IRON OR STEEL TANKS.

DESIGNS. SPECIFICATIONS, and ESTIMATES FREE.

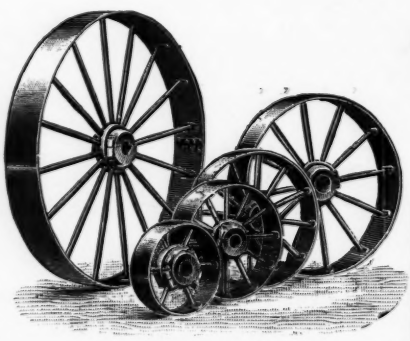
PIG IRON (SPECIAL QUALITY) for Engine Cylinders. GAS COAL famous for its unrivalled excellence.

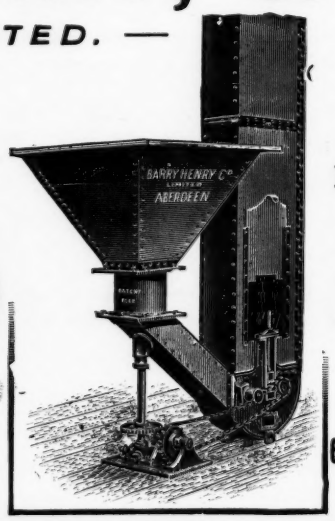
BARRY, HENRY, & CO.,

— LIMITED. —

Specialities:
TRANSMISSION OF POWER.
Rope & Belt Pulleys,
Spur & Bevel Wheels,
Shafting & Couplings,
Pedestals, & Fixings.

WORKS:
ABERDEEN,
SCOTLAND.





Specialities:
TRANSMISSION OF MATERIALS.
Conveyors,
Elevators,
Grinding Machinery,
Motors.

AND
64, MARK LANE,
LONDON, E.C.

ANTI-VIBRATION INCANDESCENT LIGHTING CO., LD.,

35, KIRKSTALL ROAD, LEEDS,

Will be pleased to see you at their

STAND Nos. 68/103,

At the International Gas Exhibition, Earl's Court W., Nov. 19 to Dec. 17.

Anti-Vibrators for all purposes. **DO NOT FAIL TO GIVE US A CALL.**

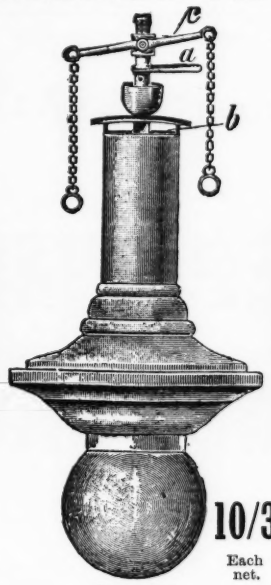
WOLFF-LIGHT INVERTED LAMP.

A perfect inverted Incandescent Lamp—No Carbonizing—Marvellous Durability, Intensely Brilliant Light at a reasonable price. Extraordinary Demand. Gives about 130 c. p. light. Consumes about 4 cubic feet of Gas. Fitted with Bye-Pass Gas and Air Regulator. Call and see it and you will be convinced.

The well-known
CROWN Mantle.

Popular by Merit.

27/-
Gross net.



10/3
Each net.

No. 321.

THE **CILCO Mantle.**
New Secret Process.

Best Double-Ply Ramie Thread.

30/-
Gross net.

SPECIAL TERMS TO GAS UNDERTAKINGS.
Illustrated Lists Free on application.

THE
CROWN INCANDESCENT LIGHT CO.,
112, Newington Causeway, LONDON, S.E.
Telegrams: "CROWNALITE, LONDON." Telephone No. 7365 Central.

THE 'CHAMBERLAIN' INVERTED LIGHT.

An Inverted . . Incandescent Gas-Burner.

MADE IN ENGLAND.

No Soot.
No Lighting Back.
No Discoloration of Fittings.

Best and Cheapest.

ALL PARTS RENEWABLE.

BURNERS, 3s. 9d.
MANTLES, 7s. 6d. and 6s. per dozen.
Special Discounts.

Consumes only 2½ cubic feet of Gas per hour.
75-CANDLE POWER.

CHAMBERLAINS LTD.,
149, Gray's Inn Rd., LONDON, W.C.
Telephone No. 4898 HOLBORN. Telegrams: "ETCETERAS, LONDON."

AGENTS WANTED.

The "BRAY" Incandescent Gas
BURNERS AND MANTLES.

A BRILLIANT COMBINATION.

The "Bray" Burner gives a Maximum Light with a Minimum consumption of Gas.

PROFITABLE EVERY WAY.

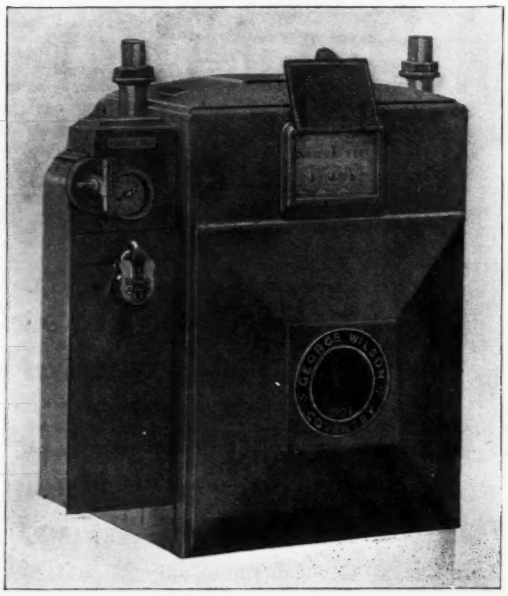
The "BRAY" XXX Mantle

RAMIE FIBRE. DOUBLE WOVEN. EXTRA STRONG.

Send for Catalogue and Price List.

GEO. BRAY & CO., LTD., GAS LIGHTING ENGINEERS, LEEDS.

See our Exhibit, Stands Nos. 73 and 98, at the International Gas Exhibition, Earl's Court, S.W., Nov. 19 to Dec. 17.



DRY PREPAYMENT METERS.

GEORGE WILSON,

GAS METER MANUFACTURER,

COVENTRY:
254, FOLESHILL ROAD.
Telegrams: "GASMETER, COVENTRY."

THE HAGUE:
LOOSDUINSCHE WEG.
Telegrams: "WILSON, THE HAGUE."

R. LAIDLAW & SON, LIMITED.

GAS ENGINEERS,

Gas Meter Manufacturers,

AND

IRON & BRASS FOUNDERS,

EDINBURGH, GLASGOW, & LONDON.

SEE OUR EXHIBIT

INTERNATIONAL GAS EXHIBITION, EARL'S COURT,

STAND No. 46c, Queen's Palace Annexe.

The Welsbach·Kern (Patent)

Self-Intensifying Lamps.

Length overall.
604a 2 ft. 8 in.
604b 3 ft. 3 in.
604c 4 ft. 2 in.

Width overall.
Reflectors.
Enamelled. Opal.
604a 16½ in. 18 in.
604b 22 in. 24 in.
604c 24 in. 26 in.

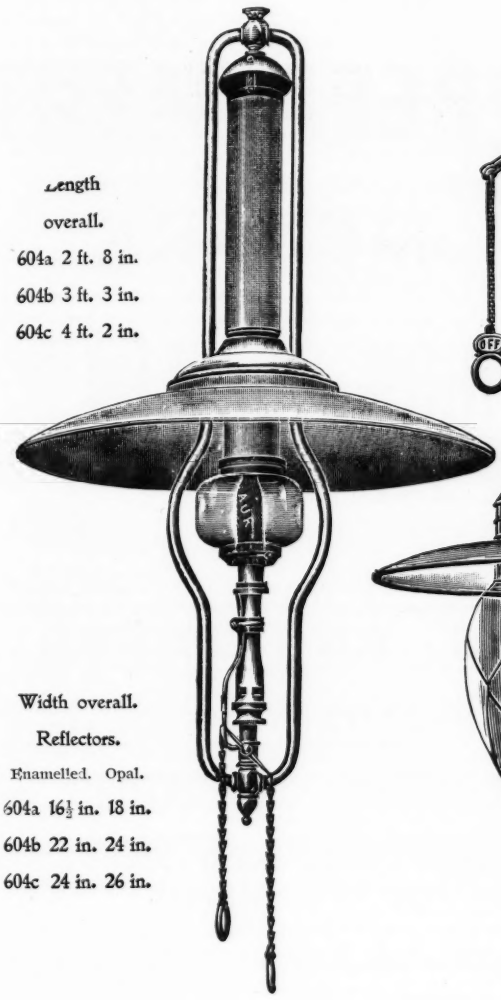


Fig. 604.

Interior Lighting. Enamelled.

A	5 ft. per hour,	150 c.p.,	£1 13 0
B	10 ft. „	300 c.p.,	2 8 0
C	20 ft. „	600 c.p.,	4 4 0

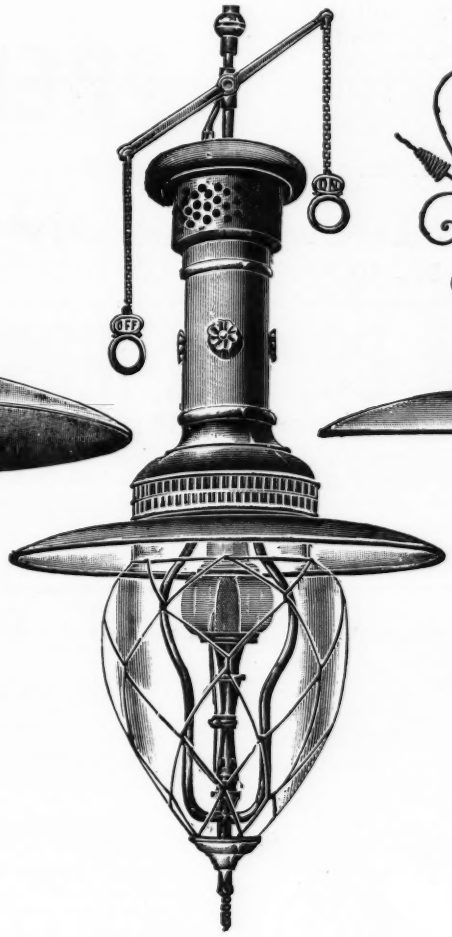
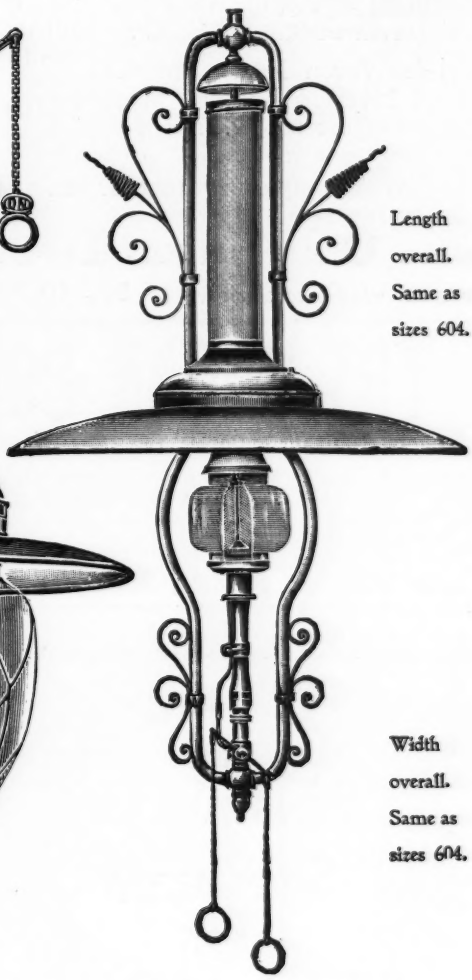


Fig. 607.

Overall.	Length.	Width.
607b	4 ft. 4 in.	24 in.
607c	5 ft. 0 in.	29 in.

Storm Proof Arc. Enamelled Reflector, Cup and Ball Joint, Lever Tap and By-pass.

607b 10 ft. per hour, 300 c.p. £5 0 0
607c 20 ft. „ 600 c.p. 7 10 0



Length overall. Same as sizes 604.

Width overall. Same as sizes 604.

Fig. 605.

Interior Lighting (Ornamental).

605a	5 ft. per hour,	150 c.p.,	£2 5 0
605b	10 ft. „	300 c.p.,	3 16
605c	20 ft. „	600 c.p.,	5 0 0

SUBJECT TO OUR USUAL TRADE DISCOUNT.

The Welsbach Incandescent Gas Light Co., Ltd.

2 to 14, Palmer Street, Westminster, London, S.W.

Telegrams—"Welsbach," London. Telephone—290 West.

G.I.C.

Novelties.

The "Simplon"

INVERTED BURNER

is simplicity itself.

Price complete with Mantle and Globe, **30s.** per doz.

ORDER NOW FOR DELIVERY IN ROTATION DURING NOVEMBER.

Double Woven Ramie Mantles for all Inverted Burners, finest and strongest made, Price **45s.** per gross.

G.I.C.

Maintenance.

IMPROVED

RAMIE MANTLES

for every known size of Burner.

We are supplying these well-known Maintenance Mantles for "C" and Nos. 2 and 3 Kern Burners, from **26s.** per gross, with reductions for quantities.

WRITE US FOR LATEST PRICES, THEY WILL ASTONISH YOU.

G.I.C.

Maintenance.

	Per Gross.
Clear Domestic Chimneys	**19s.**
Opal Chimneys	**24s.**
Clear Normal Chimneys .	**20s.**
Opal „ „ .	**26s.**
Opal Combinations . . .	**42s.**

New Polished Brass Outside Air Cone for use with above improves the appearance of Burner and increases the light by 25%. Easily fixed to existing Burners without injury to Mantles, **4/6** per gross. **G.I.C.** Heavy "C" Burner with real steatite ring, **59**/- per gross.

N.B.—All our Glass is about 10% cheaper when taken in original cases, and we pay carriage to your works.

We supply everything for Maintenance at Factory Prices—get these Prices at once.

Sole Manufacturers—

The GENERAL INCANDESCENT COMPANY, Ltd.,

Telegrams: "ASABLAZO LONDON." **56, CITY ROAD, LONDON, E.C.** Telephone: No. 9536 London Wall.

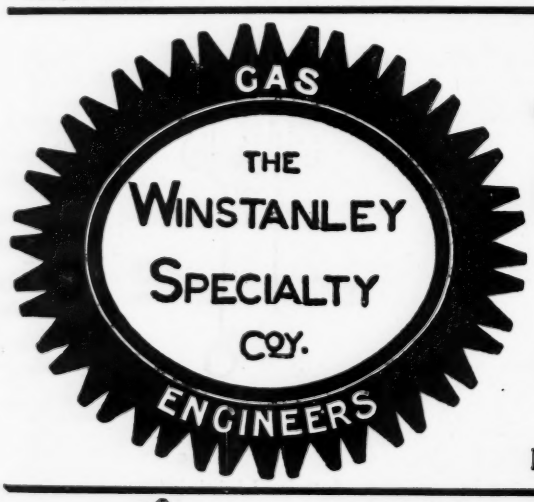
THE WIGAN COAL & IRON CO., LIMTD.,

Respectfully invite Inspection of their Products upon STANDS Nos. 117 & 144, at the Earl's Court Gas Exhibition.

They are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND AND WEST OF ENGLAND DISTRICT OFFICE: *6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.*
Telegraphic Address "WIGAN, BIRMINGHAM." Telephone No. 200.

LONDON DISTRICT OFFICE: *6, STRAND, LONDON—C. PARKER & SON, Sole Agents.* Telegraphic Address: "PARKER, LONDON."



GAS ENGINEERS.

CONTRACTORS FOR, AND ERECTORS OF, ALL GAS-WORKS PLANT.

REGENERATORS, GENERATORS, AND DIRECT-FIRED RETORTS.

RESULTS GUARANTEED.

COMPLETE INSTALLATIONS OF HORIZONTAL AND INCLINED RETORTS.

ADDRESS—

NEWTON CHAMBERS, CANNON ST., BIRMINGHAM.

D. HULETT & CO., LTD.

Show-rooms and Offices: 55 & 56, HIGH HOLBORN, LONDON.

Lamp & Meter Works: HARPUR MEWS, THEOBALD'S RD., LONDON.

MANUFACTURERS OF

OUTSIDE GAS-LAMPS

Suitable for Incandescent or Ordinary Burners.

DRY GAS-METERS, SERVICE-CLEANSERS, &C., &C.

PRICE LISTS ON APPLICATION.

STARTLING INVENTION!

Carborundum Bricks, Carborundum Crucibles, &c.

DR. ENGELS' PATENT

CARBORUNDUM COATINGS

For Lining **GAS-GENERATORS.**

For Lining and Repairing **GAS-RETORTS.**

For Metallurgical and Chemical purposes, Furnaces, and Firing Plants of all kinds.

The Fire-Proof Products Co., Ld.

Representative: **Richard Cremer,**

CIVIL ENGINEER, WOODHOUSE LANE, LEEDS.

THE LEEDS FIRECLAY CO., LTD.

JOSEPH CLIFF & SONS' BRANCH.

Cliff's Wortley Silica Bricks.

FOR Arches and Crowns where high heats are required. They contain over 90 per cent. of Silica, and are nearly stationary under the influence of heat, swelling a little rather than contracting. They are not like a Gannister or Dinas Brick, but a Fire-Brick of a highly Silicious nature.

Cliff's Wortley Aluminous Bricks.

THESE are for Side Walls where great wear and tear takes place. Are made of a specially prepared mixture, are high in Alumina, and are what is termed a HARD FIRE-BRICK.

BALTIC WHARF, WATERLOO BRIDGE, LONDON, S.E.

Liverpool: Leeds Street. Leeds: Queen Street.

BEST & LLOYD

MAKERS OF THE **BIRMINGHAM** Limited,

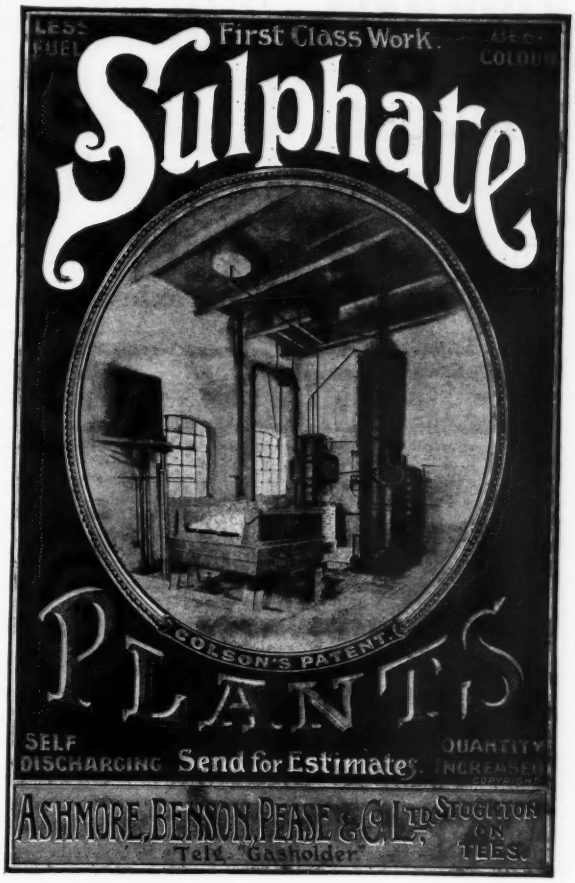
PATENT "SURPRISE" PENDANT,

WITH PATENT SHADE.

OVER 50,000 NOW IN DAILY USE.

The ONLY GAS-PENDANT suitable for Domestic Lighting; a room 18 ft. by 14 ft. being beautifully illuminated with one Incandescent Burner.

Used in the private apartments of their **Majesties the King and Queen** *at Sandringham.*



MECHANICAL COAL HANDLING PLANTS

OF ANY MAGNITUDE

MADE AND ERECTED BY

GIBBONS BROTHERS LTD

DUDLEY & LONDON

KIRKHAM, HULETT, & CHANDLER, LIMITED,

Patent "STANDARD" Washer-Scrubbers and Purifying Grids

Will be on view at **STAND No. 168,** Queen's Palace, International Gas Exhibition, Earl's Court, W.

Palace Chambers, Bridge Street, Westminster, S.W.

Telegraphic Address: "WASHER, LONDON." Telephone No. 127 VICTORIA.

COAL TAR PRODUCTS.

Benzol, Toluol, Solvent Naphtha, Creosote Oils, Grease Oils, Carbolic Acid, Crude Creosote Salts, Granulated (Crude) Naphthalene, Sublimed Naphthalene, Anthracene, Refined Tar, Pitch, also Sulphate of Ammonia.

For Prices apply to the **SOUTH METROPOLITAN GAS COMPANY,**

Works: ORDNANCE WHARF, EAST GREENWICH, LONDON, S.E.

709, OLD KENT ROAD, LONDON, S.E.

Telegraphic Address: "METROGAS, LONDON."

THE GAS-METER COMPANY, LD.

WORKS: 238, Kingsland Road, LONDON, N.E.;
Union Street, OLDHAM; Hanover Street, DUBLIN; 20, Fennel Street, MANCHESTER.

AUTOMATIC METERS.

FOR ANY COIN.

To change Price of Gas, remove Wheels marked T & B (Top & Bottom); replacing them with other Price Wheels sent free on application.

Telegraphic Addresses: "METER LONDON." "METER OLDHAM." "METER DUBLIN." "METER MANCHESTER."

Nat. Telephone Nos.: 142 DALSTON. 340 OLDHAM. 1995 DUBLIN. 2918 MANCHESTER.

GUARANTEED 5 YEARS.

WETS OR DRYS.

Front View with Index Door Removed.

Kindly give us a call at STAND No. 54, Queen's Palace, International Gas Exhibition.

THERE IS STILL JUST TIME

to order

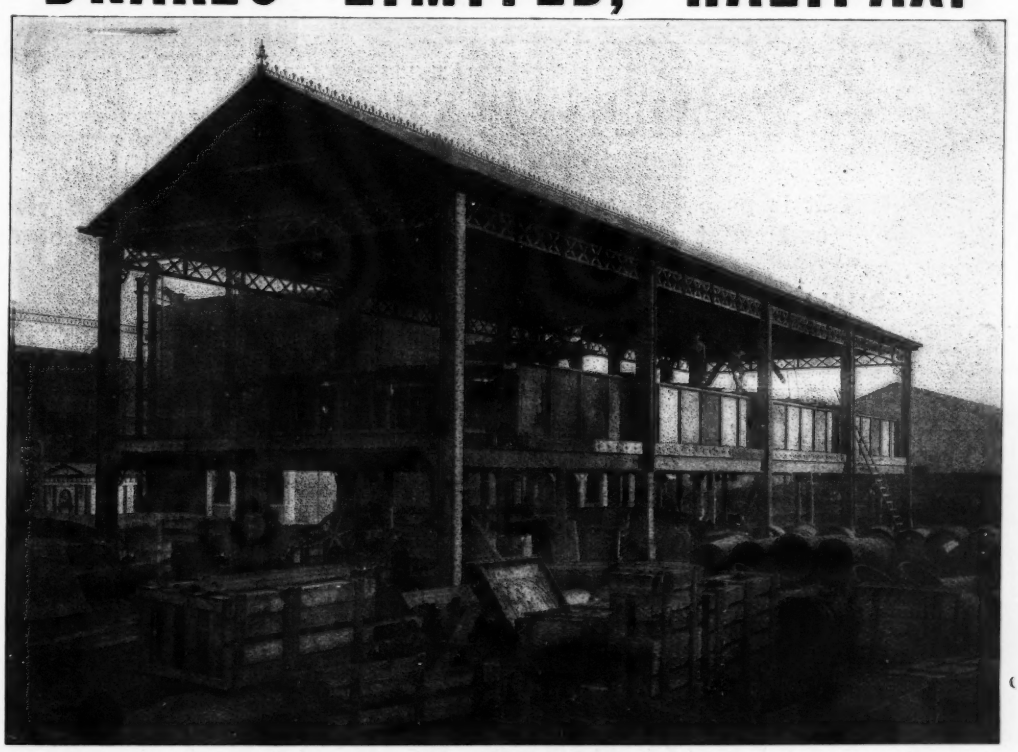
"ACME" GAS-FIRES

for

XMAS TRADE.

ARDEN HILL & CO., "ACME" WORKS, BIRMINGHAM.

DRAKES LIMITED, HALIFAX.



WE RECENTLY ERECTED THESE 4 PURIFIERS, 30 FEET SQUARE, WITH SUPERSTRUCTURE, ROOF, AND OXIDE ELEVATOR AND CONVEYOR.

See our Exhibit, Stands Nos. 69 & 102, at the International Gas Exhibition, Earl's Court, Nov. 19 to Dec. 17.

HENRY BALFOUR & CO.
LIMITED,

LEVEN, FIFESHIRE.

Contractors for the Supply and Erection of all Classes of

Gas-Works Plant.

THE "ANNULAR" BRUSH WASHER-SCRUBBER

(CREEKE'S PATENT).

Made with Cast-Iron or Mild Steel Cylinders.

PRICES AND PARTICULARS ON APPLICATION.

Do not fail to visit us at the International Gas Exhibition, Earl's Court, W., Nov. 19 to Dec. 17, Stand No. 18.

London Representative: MR. HENRY PUPLETT, 47, VICTORIA STREET, S.W.

WE ASK YOU

TO TEST THE MERITS OF OUR **"OMEGA."**

FOR EFFICIENCY AND ECONOMY IT IS UNEQUALLED.

THE ONLY HEATER SUITABLE FOR **HIRING OUT.**

It is practically Indestructible. Cheaply Installed and Revived as New at a very little Cost. It is a Portable Hygienic Hot Air Circulator of great power.

SHALL WE SEND YOU SAMPLES AND PRICE LIST?

THE "OMEGA" ODOURLESS GAS STOVE CO., LTD., WILDER STREET, BRISTOL.

CONTENTS.

EDITORIAL NOTES.

GAS, &c.—
The Gas Exhibition and its Lessons . . 823
The Suggested Institution of Gas-Works Contractors and Manufacturers . . . 824
The International Meeting at Earl's Court 825
The York Mansions Photometrical Tests—Canterbury and Its Smoke—Electricity and the Cost of Public Lighting—Bottled Sunshine for Public Lighting—Affiliation 825

WATER AFFAIRS—
British Association of Water-Works Engineers 826
The Cost of London Water Undertakings . 827

ESSAYS AND REVIEWS.

Notes from Earl's Court 828
The Suggested Gas Exhibition in Manchester 830
Visit of Continental Gas Engineers to the International Gas Exhibition 831
Gas Stock and Share Market 834
The Suggested Institution of Gas-Works Contractors and Manufacturers 835
The British Canal Problem 835

COMMUNICATED ARTICLES.

Municipal Trading and Electricity Supply . 836
Naphthalene Removal. By William Young . 837
The Testing of Burners and Mantles. By Victor A. Rettich 838

TECHNICAL RECORD.

Working Results from Dellwik Water-Gas Plants 839
Pressure Raising Plant at the Dover Gas-Works 840
A Notable Illustration of High-Pressure Lighting 842
British Association of Water-Work Engineers—Winter Meeting in London. 842
The Explosion at the Mill Hill (Hendon) Gas-Works 844
Carbonizing Ovens *v.* Gas-Retorts 845
Oxide Purification 846
New Gas Grillers 848

REGISTER OF PATENTS.

Discharging Coke from Retorts and Cooling Same—Waddell, Alex. & Forbes . . . 849
Lighting Gas-Burners by Electricity—Duckham A. M'D. 849
Bodies Adapted for Lighting Purposes and Rendered Incandescent by Heat or Electricity—Ladd, J. H. 849
Mantles of Incandescent Gas-Burners—Johnson, T. K., and M'Kean, W. 850
Retaining Incandescent Gas-Burners when on Brackets in a Vertical Position—Hendry, J. 850
Cnarging Gas-Retorts—Deighton, G. . . . 850
Incandescent Gas-Burners—Beaumont, T. A. 850
Hydraulic Main—Lake, H. H. (Trump, E. N.) 851
Incandescent Gas-Burners—Alexander, C. J. 851
Production of Oil Gas—Rincker, F. G. C., and Wolter, L. 851
Incandescent Gas-Lighting Fittings—Hutchinson, J. 852
Patent Notices 852

CORRESPONDENCE.

United Management of Gas Undertakings . 853
Improved Arrangement of Carbonizing Plant 853
The York Mansions Photometrical Tests . . 853
The Testing of Burners and Mantles . . . 853

LEGAL INTELLIGENCE.

Supreme Court of Judicature—Court of Appeal—Metropolitan Water Board *v.* Westminster City Council 854
Question as to a Rebate from a Water-Rate . 854
Conviction for Stealing Gas at Oxford . . 854
Tampering with Prepayment Meters . . . 854

MISCELLANEOUS NEWS.

A Gas-Works Explosion at Mill Hill, Hendon 855
Proposed Improvements at the Stockport Gas-Works 855
Liverpool and Carburetted Water-Gas—Deputation to the Board of Trade . . . 855
Lancaster Corporation Gas Supply . . . 855
Leeds Gas Workers and the Unemployed . 856
The Gas Purchase Question at Hessle . . 856
Extension of the Worsbro' Dale Gas-Works . 856
Storage of Carbide of Calcium 856

MISCELLANEOUS NEWS (*continued*)—

Asphyxiation of a French Deputy—A Defective Gas-Stove 856
Animals Suffocated by Gas 856
Breakdown of Electricity at Bradford—The City in Darkness 857
Gas and Electric Lighting at Devonport . . 857
West Bromwich Gas and Electricity Supply. 858
Cost of the London Water Undertakings . . 858
Electric Lighting Costs at Barnstaple. . . 860
Metropolitan Water Board 860
Birmingham Water Supply—Quality of the Welsh Water. 861
Teignmouth Water Supply—Alternative Pipe-Lines for a Supply from Paignton . . . 861
Barnsley and the Midhope Water Scheme . 862
Notes from Scotland 862
Current Sales of Gas Products 863
Coal Trade Reports 864
Trade Notes 865
Stock and Share List 867

PARAGRAPHS.

Obituary and Personal 836
Yorkshire Junior Gas Association—The Question-Box—The Life and Duty of Nernst Electric Lamps 844
Sales of Stocks and Shares—High-Power Gas Lighting in Southwark. 852
Illuminating Power of London Gas—Electric Street Lighting at Dudley. 853
The Omagh Gas-Works Award 856
Gas-Works Fatality at Birmingham . . . 858
The Management of the Cheltenham Electricity Undertaking 859
Incandescent Burners for Street Lighting in Birmingham 864
The Price of Gas to Prepayment Consumers at Dukinfield—The Gas-Tank Explosion in Chicago 865
Accident at the Faversham Gas-Works—Gas Lighting at the Colston Hall, Bristol—Newry in Darkness—Trawden Water Supply—Sulphur in Wandsworth Gas—An Electric Lighting Annoyance—North Warwickshire Water Company 866
Southport Gas Supply—Unsatisfactory Results at the Elland Electricity Works . . 867

Messrs. HUMPHREYS & GLASGOW

AND

THE UNITED GAS IMPROVEMENT CO., U.S.A.

CARBURETTED-WATER-GAS PLANT

— *DOUBLE-SUPERHEATER SYSTEM.* —

H. & G., LONDON **152,300,000** Cu. Ft. Daily

U. G. I. CO., U.S.A. **432,300,000** Cu. Ft. Daily

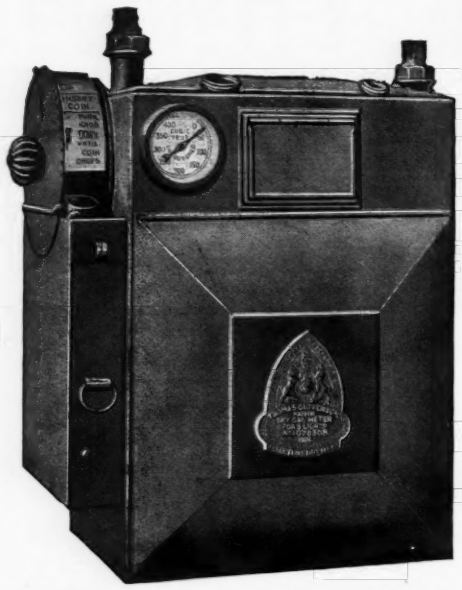
TOTAL 584,600,000 Cu. Ft. Daily

Messrs. HUMPHREYS & GLASGOW,
38, Victoria Street, London, S.W.
31, Nassau Street, New York.

THE UNITED GAS IMPROVEMENT COMPANY,
Philadelphia.

Telegrams { "EPISTOLARY, LONDON." "HUMGLAS, NEW YORK."

THOMAS GLOVER & CO.'S



PATENT NEW IMPROVED PREPAYMENT METER

For Pennies, Shillings, or any Coin.

Simple in Mechanism.
Positive in Results.
Price Changer *in Situ.*

GUARANTEED FOR FIVE YEARS.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 6159 Bank.

THOMAS GLOVER & CO., LTD.,

GAS-METER MANUFACTURERS,

LATE OF CLERKENWELL, NOW 49, QUEEN VICTORIA STREET.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 6159 Bank.

BRISTOL:	BIRMINGHAM:	MANCHESTER:	GLASGOW:	BELFAST:	MELBOURNE:
28, BATH STREET.	57 & 58, BROAD STREET.	132 & 134, CORN EXCHANGE BUILDINGS.	26, WEST NILE STREET.	8, EXCHANGE PLACE, DONEGALL STREET.	23, WRIGHT'S LANE, LONSDALE STREET
Telegraphic Address: "GOTHIC."	*Telegraphic Address:* "GOTHIC"	*Telegraphic Address:* "GOTHIC."	*Telegraphic Address:* "GASMAIN."	*Telegraphic Address:* "GOTHIC."	
Telephone No. 1008.		Telephone No. 3898.	Telephone No. 6107 Royal.		Telephone No. 3716.

PARKINSON'S

PREPAYMENT METERS

For Pence, Shillings, or any Coin.

SIMPLICITY . .
DURABILITY . .
EFFECTIVENESS } COMBINED.

See our Exhibit, Stands Nos. 22/29, at the International Gas Exhibition, Earl's Court, Nov. 19 to Dec. 17.

PARKINSON AND W. & B. COWAN, LTD.
(*Parkinson Branch*),

COTTAGE LANE, CITY ROAD, LONDON. | BELL BARN ROAD, BIRMINGHAM.

JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. LXXXVIII., No. 2170.—TUESDAY, DECEMBER 13, 1904.

EDITORIAL NOTES—GAS, &c.

The Gas Exhibition and its Lessons.

THERE was not perhaps much in regard to either public or domestic lighting with which the Continental visitors to Earl's Court last Tuesday were not already familiar; but the display of cooking and heating appliances, meters, and manufacturing plant is one of which this country has no cause whatever to be ashamed. That it compares most favourably with that of 1882-3 has already been said; nor is there any reason for supposing that in any single particular it compares unfavourably, to say the very least, with the best Continental practice in this regard. There are but few foreign exhibits, and consequently any comparison is out of the question; but the visitors could have seen but little, if anything, which was not fully up to the standard of British excellence in design and finish.

The paper by Mr. Alfred Colson, to which reference was made in our last article on this subject, commences with the observation that "it has recently been stated by the "chief official of a large provincial undertaking," that "the "slot-meter system is always unsatisfactory, and involves "a considerable amount of loss." If that were so, many undertakings ought now to be in a "parlous" condition; whereas, on the contrary, those undertakings having the largest number of slot meters in use are among the most flourishing. In this very paper, for example, it is shown that 22 per cent. of the total consumption in Leicester is through prepayment meters. The extra charge for this consumption does not cover the additional cost for meter, stove, fixing, and upkeep, collection, inspection, &c., by rather more than ½d. per 1000 cubic feet; but there are important advantages to be set against this. These are chiefly as follows: Additional consumers who would not otherwise burn gas; increased day and summer consumption; saving in bank interest and staff expenses. This weighty testimony should of itself be sufficient to remove all doubts as to the financial success of the system; but what, it may be asked, would have been the position to-day of the South Metropolitan Gas Company without its 164,276 slot-meter customers? Have they been to it a source of weakness or of strength? If of weakness, how much less than 2s. per 1000 cubic feet ought the Company to be now charging? If of strength, to what extent may the reduction to that price be attributed to it? There is, it would seem, overwhelming evidence that the slot meter, or the system which it represents, has come to stay; and there must be special and unexplained reasons for its failure in the case of the "chief official of a large provincial "undertaking." It has been said that to doubt success is to court failure; and certainly this system ought to be embarked on in no doubting mood, but with the full intention of making it a success. All tendency to extravagance in outlay should be sternly checked; since, under the most favourable of circumstances, the consumption per consumer cannot support any undue outlay; and it is open to question whether the Leicester plan of not providing any fittings in the shape of pendants, brackets, &c., is not deserving of more general adoption. Its success shows at any rate that it is not invariably necessary to provide such fittings in order to secure this class of custom.

This prepayment system, it need hardly be said, has grown up entirely since the exhibition of 1882-3, at which date it had not even been thought of. It was not until a few years afterwards that the late Mr. R. W. Brownhills, of Walsall, exhibited the first development of his idea of a prepayment meter. If we rightly remember, the mechanism for controlling the supply was placed on the top of a wet meter, in proximity to the outlet. But little or nothing was done with the meter in its original form; and to all intents and purposes only the idea of its conception now remains. It must, however, always remain a matter of great regret that the originator of the idea reaped no benefit from it, and that he did not live to see more than the commencement of its marvellous development. His estimate of its value, whatever this may have been, could never have anticipated what has really resulted from it—namely, the creation of what is practically a new industry, and the spread of light and comfort to almost every home in the land. Among the names of those who have done well for the gas industry, that of Mr. Brownhills must ever find an honourable place. His spirit permeates the exhibition, and may be said to form an integral part of it. Not only are "penny-in-the-slots" numerous among the exhibits, but there are also shilling-in-the-slot meters as evidence of an extension of the system to a higher class of customers. Good service has been done by the Gaslight and Coke Company in fitting up rooms to represent a small consumer's dwelling supplied upon the prepayment system. Furnished plainly and neatly, these rooms form an ideal of comfort to which every consumer of this class, however humble, may aspire.

Professor Vivian B. Lewes, in his article on "Gas and "Gas Lighting" in the Encyclopædia Britannica, which was published about two years ago, mentions that "in Ger- "many nearly 90 per cent. of the gas lighting is done by the "aid of the incandescent mantle, but in England it has "only reached to about 30 per cent. of the whole." Quite recently—namely, at the last general meeting of the Imperial Continental Gas Association—Mr. J. Horsley Palmer, who presided, bore still more striking testimony to the all but universal sway of incandescent lighting on the Continent. Referring to a visit which he and some of his co-Directors had paid to the twelve towns that are lighted by the Association, he said: "He thought that one of the great "object-lessons which the Directors learnt was the complete "extinction of the old-fashioned flat-flame and other burners. "They saw nothing but the incandescent burner and mantle. "He (the Chairman) searched Berlin through to find flat- "flame burners. Every little side street, every *cul de sac*, "every lane in the suburbs, even the basement shops in the "poorest quarters of Berlin, all were brilliantly lighted by "the incandescent gas-burner." If the same cannot also be said of this country, the time is surely approaching when it will be; and this gas exhibition invites all and sundry to help forward that time, and wipe out the reproach that now rests upon this country of being less progressive in this respect than its neighbours.

The question to which Mr. Helps referred last Tuesday, at the International banquet, as having been put to him by some engineers—namely, What is the good of the exhibition? may be variously answered. If, for example, the exhibition has served no other purpose, it has at all events opened the eyes of the public as these have never been opened before to the advantages and possibilities of incandescent gas lighting. "If I had not known it was gas, I should have said "it was the electric light," was an observation overheard opposite one of the stands; and forthwith an order was placed at that particular stand. If there be such a thing as a flat-flame burner for lighting purposes in the whole building, it is very effectually screened from observation. Incandescent burners are there in great variety; and probably no public or private building was ever before so brilliantly and effectively illuminated. Yet, at this very time, the attention of Parliament is to be engaged in the consideration of a proposal to test for illuminating power with a flat-flame burner! Has it occurred to anyone to invite the London County Council to view the exhibition, it may be asked? There is no need now to go to Berlin to become convinced that the flat-flame burner for illuminating purposes must soon become a thing of the past.

Whether the invention of incandescent gas lighting was, as some have been led to infer from the incidents of its birth, the child of necessity, or whether it was stumbled upon in the course of scientific investigation pursued in special and unfrequented channels, it was equally fortunate for the gas industry, more especially as its appearance coincided so nearly as it did with a period of great and exceptional activity in the development of electric lighting. It is true that at the exhibition of 1882-3 it was demonstrated that gas could hold its own for the lighting of large spaces by means of high-power flat-flame burners, and singly or

in groups; while for domestic lighting there was not only the double chimney argand burner—a development of Sir Edward Frankland's idea of more than thirty years before—but also the regenerative burner invented by Mr. Friedrich Siemens in 1879, of which there were afterwards many types. The popularity for a time of the regenerative system, represented also by the Clark, the Wenham, and other burners, showed how keenly desirous were the public of obtaining improved means of illumination. But they were fast changing to electricity when the Welsbach incandescent burner made its appearance. This was in 1886. But for years afterwards its success was doubtful, and only became assured by a great discovery five or six years later of the precise mixture of rare earths that was required to give the best results. Without pursuing the history of this subject, it may be mentioned that, whereas the first incandescent mantles used in this country yielded only from about 4 to 6 candles per foot of gas consumed, the later ones yielded 15 candles; while improvements in the burner, by which thorough and uniform mixing of air and gas is secured prior to combustion, have since enabled 20 to 25 candles, and even more, to be obtained per foot of gas consumed.

While compression of the air or gas supply, or both, combined with specially constructed and toughened mantles, together with self-intensifying systems operating without the assistance of mechanical pressure-raisers, enable gas to far outshine the most powerful electric arc light, and while with burners of the usual kind, used either singly or in groups, the incandescent gas system is rapidly displacing all other systems for ordinary street lighting, in quite another direction a notable development is proceeding, which may have a far-reaching effect as regards domestic lighting. The shadowless inverted burner is an idea which originated on the Continent, and thus gives additional point to the observations which were made at the International banquet as to the indebtedness of this country to foreign invention. This particular one has been worked out and made practicable by Englishmen, and is now before the public in various forms. One of these—namely, the small or bijou burner—consuming from 1 cubic foot of gas per hour and upwards, appears to be specially adapted for pleasing and economical lighting where diffusion rather than concentration of light is desired, and should prove a powerful rival to the incandescent electric lamp. Such a burner tends also to promote cleanliness, inasmuch as from so small a consumption the upward current of heated air (carrying with it particles of dust and dirt) is not nearly so likely to reach as far as the ceiling as one from a much larger burner. Moreover, any help to economy of consumption is to be welcomed, not only for its own sake, but also because it reduces the chance of inconvenience from the products of combustion.

The Suggested Institution of Gas-Works Contractors and Manufacturers.

THE idea that the section of the gas industry comprising gas-works contractors and manufacturers should have an Institution of their own, has, we believe, found acceptance in many quarters; but the novelty of it naturally produces a little reservation before pronouncing an unqualified approval. The fitness, however, of the suggestion at a time when the one section of the industry are co-operating with the other, with unremitting energy, for the common weal, is fully recognized; and, if anything is to be done, it is agreed that a better time could not be chosen for discussing the project, and, if thought advisable and useful, for putting the preliminaries in train. Nothing final should, of course, be done in haste; but if anything is to be done at all, consideration should commence before the feeling of a unity of interest and object which has been engendered by the Gas Exhibition has had time to be roughened by the scattering of the exhibitors and the resumption of the ordinary routine of commercial life. To this end, and acting upon the suggestion made in the closing paragraph of the article in last week's "JOURNAL," Mr. Charles Clare, the Chairman of the Exhibitors' Committee, has addressed a letter to the whole of the British firms represented at Earl's Court, calling a meeting of principals, directors, and managers of exhibiting concerns trading with gas-works in all branches for next Saturday morning, at eleven o'clock, at Earl's Court. We understand that Mr. Clare's object in choosing that date is that Saturday, being the closing day of the exhibition, would, in the ordinary course of things, bring many of those concerned to London; and the engagement will therefore fit in well with their arrangements. The communication sent out by Mr. Clare is as follows:—

> You will doubtless have read an article in the "JOURNAL OF GAS LIGHTING" for the 6th inst., suggesting that a meeting of the Exhibitors' Committee should be called to express an opinion as to the advisability or otherwise of forming an Institution of Gas-Works Contractors and Manufacturers.
>
> As Chairman of that Committee, I accept the suggestion, especially as I have found that many members are wishful that the question should be considered whilst we are assembled together at the present great exhibition.
>
> The meeting will be entirely a preliminary one; and the fact of any manufacturer attending it will not be considered to commit him in any way to a definite line of action.
>
> Will you, therefore, kindly attend a meeting of exhibitors to be held at the Café Chantant, Earl's Court International Exhibition, on Saturday, the 17th inst., at 11 a.m.

There are two things bearing upon this circular to which Mr. Clare desires that special attention should be drawn. The first is that, while this meeting is confined by him, as Chairman of the Exhibitors' Committee, to the exhibitors at Earl's Court (his power to presume to act ceases with them), its whole object is to generally discuss the question, and to ascertain whether they, as a body, shall take the initial steps in the matter. If so, then from them will issue invitations to all gas-works contractors and manufacturers who are unrepresented at the exhibition, to further consider, in conjunction with those who are present at this preliminary meeting, any resolutions then passed, together with the question of future procedure connected with the founding of an Institution. The second point is that contained in the third paragraph of the letter—that the attendance of any manufacturer at the meeting on Saturday "*will not be considered to commit him in any way to a definite line of action.*" In view of this, we hope that all exhibiting firms will be adequately represented at the meeting, and that all will go prepared, by a previous thorough consideration of the article published last week, to contribute to a full and free interchange of views over the matter. As the meeting may have a far-reaching result, the importance of being there cannot be too greatly emphasized.

While approval has been given by several to the scheme, it has been, as already remarked, with the reservation that that approval is subject to further deliberation; and this is an attitude which precisely accords with the view entertained when the idea was under consideration, before the article of last week was penned. It is not a scheme that should be swallowed without the arguments *pro* and *con* being raised, dissected, and fully examined. Further consideration, however, has not weakened our own opinion that there are no valid reasons against gas-works contractors and manufacturers having an Institution of their own, in order to give them a corporate standing in the gas industry, and with a Council of responsible men, elected and subject to change in manner similar to the Council of the Institution of Gas Engineers, and representative of all branches of the great commercial side of the industry.

The only two objections so far heard to the scheme are that it may be regarded by those outside as being something in the nature of a ring. Little consideration will show the absurdity of that. In the first place, the constitution of the organization would be on such lines as to disabuse all minds of any such effect. The composition of the Council could be specifically so arranged and the rules so drafted as to prevent a preponderance of representation for, and the Institution being used to subserve the interests of, any one branch of the gas trade. Again, membership of the Institution would not be any more a matter of compulsion than membership of the Institution of Gas Engineers in the case of a gas manager. Whether or not there is an Institution of Gas-Works Contractors and Manufacturers, it will make little difference to sectional trade combinations. Without such an Institution, combination with various objects in view has not been an unknown thing of the past; and even now there may be such combinations in active existence. We do not say there are, but there may be. Therefore, to oppose such an objection to the suggested Institution is nothing more than conjuring with a phantom; and, in our opinion, it may be dismissed as unworthy of further consideration. The second point is equally without foundation; and it may be presented and settled by the one remark that the relations of the proposed Institution with

the Institution of Gas Engineers—this was made abundantly clear in the article last week—are not intended to be antagonistic, but co-operative in the interests of the whole industry. The establishment of an Institution of Gas-Works Contractors and Manufacturers should have the effects of co-ordinating relations between the one section and the other, of solidifying friendship between the two, and of presenting opportunities and projects for working, through the respective organizations, with the one common end of furthering and defending those interests which are of the essentials to mutual prosperity. If in these hoped-for effects reposes the basal idea of an Institution such as has now been shadowed out, then its formation will be heartily welcomed, and cannot be resented. In this connection, let Mr. J. W. Helps's words, at the opening of the Gas Exhibition, be remembered: "The contracting parties to the "exhibition, forming a trinity which had been a unity, had "worked thoroughly with one object in view—the determi-"nation to bring to a successful end an exhibition which "they had set out to make a success." Just ponder over these words, and ask whether they cannot be made to apply, in the case of two of the parties, after the close of the exhition. We feel that they can be. Therefore it is hoped that the meeting next Saturday will provide the means for the full ventilation of the subject by all gas plant and appliance manufacturers and contractors. The wider the consideration given to it, the better for the future of the Institution, if a future it is to have.

The International Meeting at Earl's Court.

THE event of the week as regards the Gas Exhibition has been the international gathering last Tuesday. This indicated far more forcibly than any other meeting which has been, or can be, held, the widespread interest which the exhibition has aroused. Representatives from all the most important Continental Gas Associations—namely, those of France, Germany, Holland, Belgium, and Italy—were received on this occasion by the President of the Institution of Gas Engineers, Mr. D. Irving, the Chairman of the Exhibition Committee, Mr. H. E. Jones, the Chairman of the Advisory Committee, Mr. J. W. Helps, and other members of the latter Committee (with Messrs. Bridges and Smith the Organizing Managers). After lunch, the party were conducted round the exhibition, and expressed themselves highly pleased with all they saw. Their congratulations on its success must have been extremely gratifying to all concerned. It is something to have earned unstinted praise, not only from their own countrymen, but also from experts of such varied experience as were the visitors present at this gathering.

The banquet in the evening, at the Hotel Cecil, presided over by the President of the Institution of Gas Engineers, was brilliantly successful. The utmost harmony and good feeling prevailed; and the international character of the assembly was further sustained by the presence of representatives of the Colonies of Canada and Australia in the person of Mr. John Coates, of Ottawa, and Mr. R. O. Thompson, of Melbourne. The toast list was commendably short, but sufficed to occupy a long evening. In proposing success to the Continental and American Associations, Mr. Hunt referred to the indebtedness of members of the gas industry in this country for the hospitality which had on many occasions been extended to them by their Continental brethren, commencing with the visit of the then British Association of Gas Managers to the exhibition held in Paris in 1878. He rightly, however, observed that they were indebted to the Continent for something more material than hospitality—namely, the fruits of invention and ingenuity. This is indeed the case. This great gas exhibition can hardly be called an international one in the ordinary acceptation of the term; seeing that, with but few exceptions, all the exhibitors are British. But it is true nevertheless that the Continent has contributed very materially to it. The visitors on Tuesday must have seen much with which they are quite familiar. This country owes to the Continent, among other things, the modern gas-engine, which has added so greatly to the consumption of gas during recent years; the regenerative gas furnace, now almost universally employed in gas-works; some most successful labour-saving retort-house appliances; but, above all, the invention of the incandescent mantle, which has enabled gas to rear its head above its rival the electric light. This indebtedness was freely acknowledged by Mr. Hunt, and afterwards by Mr. H. E. Jones, when responding to the compliment paid him as Chairman of the Gas Exhibition. The latter bore eloquent testimony to the enormous advantage conferred upon the gas industry by the system of incandescent lighting, and repeated his belief in there being a great future in store for gas as a heating agent. It is pleasing to learn from him that the Commercial Company's gas is now being used for purposes for which it was supposed that Mond gas alone could cater.

It is but seldom that a toast is responded to by so many speeches as on this occasion—no fewer than seven being called upon, and all of different nationalities, while the fact that, of these, four were Presidents of Gas Associations, adds to the significance and importance of the occasion. A shrewd observation was made by Herr Körting, when responding for the German Association of Gas and Water Engineers, of which he is President. He declared the exhibition to be, not international, but English, and expressed his admiration for the faculty of Englishmen for taking the best of what they could find on the Continent. This could not always have been said; but it is to be hoped that the old insular prejudice against anything foreign has for ever disappeared, and that, on the other hand, there will be no disposition to overrate the circumstance. Both extremes are, in fact, to be avoided; and the well-balanced mind will judge according to merits, without regard to source of origin. Mr. Helps, who responded with Mr. Jones to the toast of "The Gas Exhibition," had an excellent account to give of its progress. Thoroughly satisfied exhibitors and an attendance full sometimes to overflowing. What more could be wished for? One thing certainly. Great regret was expressed at the abstention of some who could have contributed materially to the success of the undertaking. This regret all must fully share in; for it is a rift in the lute—the solitary speck in an otherwise cloudless horizon.

The York Mansions Photometrical Tests.

The presence in London of the members of various Continental Gas Associations ensured a large attendance at these tests during the past week; and the excellence and utility of the tests made have been commented on very favourably by various foreign engineers. The work done since the commencement, it may be remembered, covers the following ground: In electricity, open and enclosed arc lamps have been tested at differing voltages and different sizes of carbons, while Nernst lamps of each size, Bastian mercury vapour lamps, Liliputian arcs, flaming arcs, and incandescent glow lamps were experimented on—several varieties in each department. The gas tests have been made on inverted incandescent lamps, ordinary pressure street lanterns, Lucas lamps, the Scott-Snell, Welsbach, Keith-Blackman, Somzée-Greyson, Sugg, Humphrey, and others. We hope to publish a complete list of the various tests in next week's issue, by which date the experiments will have closed.

Canterbury and its Smoke.

The members of the Canterbury City Council have been working themselves up into a mild state of excitement over a recommendation of the Lighting Committee that the attention of certain firms should be called to the nuisance arising from the emission of smoke from their chimneys. One member explained that though the proposal came from the Lighting Committee, they were not in any way responsible for it; it having "really emanated from a useful, though somewhat too busy, Society that had its office in Westminster, where probably there was great scope for such an organization," and to which place its energies should be confined. Another gentleman referred to the interference of a "pettifogging" Society from London, though this word was perhaps chosen on account of its humorous possibilities, and not as being the most suitable one to describe the Association to which it was applied. It is true that a further member pointed to the fact that in London the Society alluded to was recognized as one of the most useful bodies in existence in the Metropolis; but the recommendation of the Committee was only confirmed by a small majority. Though nominally outside intervention was put forward as an objection to the adoption of the proposal, perhaps a stronger reason was to be

found in the fact that the Corporation's own electric lighting works were among the offenders. Canterbury is not exactly what one would call an industrial centre ; and it is very likely that the escaping factory smoke does not constitute an acute problem in the city. But this is no reason why even the amount of inconvenience that does exist should not be removed if possible. It is of little use pointing out to private persons the advantages of using gas-stoves from a "clearer atmosphere" point of view, if all the time the chimneys of large works are to be seen belching forth huge quantities of black smoke. The fact that the supply of gas is not in the hands of the Canterbury Corporation should not deter them from striving their utmost for the abolition of smoke—first from the factory chimney and then from the domestic hearth. The achievement of such an end would undoubtedly be a great gain to the gas undertaking, but it would be a still greater gain to the citizens generally. It is quite correct, as one of the councillors said, that, being in this world, it was necessary that they should give and take ; the question is whether a smoky atmosphere is one of the "necessities."

Electricity and the Cost of Public Lighting.

Although it is common experience that the cost of public lighting tends to increase where a corporation owns electric light works, few examples are more marked than that to which attention was called at the last meeting of the Barnstaple Town Council. Before the Corporation went in for electric lighting, they were content to spend an average of about £500 on the lighting of the streets for the autumn and winter months of the year. For the six months ended Ladyday 1903, the cost was £523. Last winter, with the electric light in operation, the cost jumped up to £813 ; while for the current six months it is estimated to be £1100. A suggestion that the increase arose from a wish to make the electricity works appear remunerative, was indignantly repelled by the Mayor. His Worship's explanation is that some streets are now lighted which were not lighted before, and that the lighting is better all round. This hardly excuses the doubling of the cost, which means a considerable addition to the rates of a small town like Barnstaple ; nor is it really any answer, because whatever the improvement may be, it could certainly have been carried out very much cheaper by improving the gas lighting. Another suggestion made at the meeting—that the Corporation let the electric light works off easily in regard to the charge for breaking up roads and other services—seems to still await an answer. The worst of the confusion between different departments of municipal work is that it is so difficult sometimes to tell what a particular piece of work really does cost. Probably a good deal of the glamour which surrounds municipal trading would disappear if every undertaking stood by itself and was conducted on a strictly commercial basis. At least, it would enable ratepayers to distinguish those which are really profitable—a small minority of such undertakings.

Bottled Sunshine for Public Lighting.

People who have occasion to visit Devonport will agree that there is abundant reason for the complaint made at the Town Council meeting last week respecting the indifferent lighting of the streets. Since the Corporation acquired the gas-works, the mains have been extended to some of the suburbs ; and thoroughfares formerly in darkness are now lighted. But in the old part of the town little or nothing has been done to improve the system of lighting which has served the town for a generation or more. For the most part the lanterns are of antiquated pattern, and the burners small and inadequate. There is one street lighted with electric arc lamps ; and there are a few examples of incandescent gas lighting, which the town owes to the late Gas Company, who, though considered old-fashioned and behind the times, were among the pioneers of this kind of lighting in the West of England. Why the Corporation have so long delayed an improvement of the lighting is difficult to understand, unless it is because their attention, so far as gas matters are concerned, has been so much occupied by problems arising out of the remodeling of the undertaking. To some extent the delay may be due to the rivalry between the Gas and Electric Lighting Departments The Electricity Committee are admittedly disappointed because so small a proportion of the public lighting has fallen to their share and the speech of the Chairman of the Committee last Thursday shows that they are anxious above all things that the matter shall not be finally closed by the adoption of incandescent gas lighting. So long as things remain as they are, there is a faint hope that benefit may accrue to the electricity undertaking ; while if the gas lighting is improved, the electric light will be doomed to make the best progress that it can as a competitive business concern, without assistance from the rates. Probably the Council will not think it necessary to wait until "Professor" Edison has evolved the scheme of "bottling up the sun's rays for public lighting," which the Chairman of the Electric Lighting Committee tells us is in contemplation. Incandescent gas lighting will suffice for Devonport's immediate needs. If the Committees who are to investigate the subject want to see what it is capable of doing in a modest way, they need go no farther away than Stonehouse, where the Devonport electricity works are situated. If they wish to compare that specimen of lighting with electricity, they can scarcely do better than extend their walk as far as Plymouth. Let them choose a dark night for the experiment, and a time when the shop windows have ceased to lend adventitious aid to the lighting of the streets. When they have done this, and weighed the cost, there will probably be not much difference of opinion, even among members of the Electric Lighting Committee, as to the system of lighting which should be adopted for the streets of Devonport.

Affiliation.

There were about twenty members present at the special general meeting of the Institution of Gas Engineers held yesterday morning, in the Lecture Hall, at Earl's Court, for the purpose of confirming the resolution as to the necessary modification and extension of the Articles of Association, passed at the meeting on the 26th ult., for the purpose of enabling the completion of the affiliation scheme. The President (Mr. D. Irving) was supported by the Hon. Secretary (Mr. J. W. Helps) and Mr. T. Goulden. The Secretary (Mr. W. T. Dunn) read the notice calling the meeting ; and then the proposed alterations in the Articles of Association, which alterations have already been fully published. The President pointed out that the meeting was purely a formal one, and moved that the Articles of Association be altered in the manner described. Mr. E. Allen (Liverpool), observed that he had the honour of seconding the motion. The resolution was a lengthy one; but it represented, as they all knew, careful consideration on the part of the bodies concerned. No one responding to the President's invitation for remarks, he put the resolution ; and it was unanimously carried. The President said this concluded the business of the meeting. On behalf of the Council, he had to thank those present for their kindness in coming up to support them, and helping to form a quorum. They were fully aware that many were there at great personal inconvenience ; and the Council tendered to them their very best thanks. This brings to an end all the necessary preliminaries that are connected with the affiliation question.

WATER AFFAIRS.

British Association of Water-Works Engineers.

THE winter meeting of the Association is always a happy reunion midway between the greater annual meetings ; and the one held last Saturday, under the presidency of Mr. F. J. Bancroft, of Hull, was, if anything, more than ordinarily so. It possessed indeed one exceptionally pleasant feature, in that Dr. Kemna, the Manager of the Antwerp Water-Works Company, came over expressly for the purpose of receiving from his fellow-members who had the felicity of taking part in the Belgian trip in June last, a superb memento of that occasion, in the shape of a silver tea and coffee service. Dr. Kemna before the trip had won a warm place in the hearts of the members of the Association, as in him is combined an uncommon degree of affability with distinguished knowledge in those higher scientific realms connected with the filtration and purity of water supply ; and these personal qualities have made his presence always a welcome one at the meetings. The recent visit to Belgium put the cap upon his popularity. It was Dr. Kemna, and he alone, who was instrumental in making the visit a never-to-be-forgotten one ; and therefore the idea

that he should have something to remind him through life of this visit was no sooner broached than the presentation (short only of the mere act) was an accomplished fact. The spontaneity of the affair will greatly add, in Dr. Kemna's eyes, to the intrinsic value of the gift which he has taken home with him.

The larger part of the meeting on Saturday was absorbed by the reading and consideration of three papers—one by Mr. George Mitchell on "The Appleton Extensions of the "Warrington Corporation Water-Works;" the second, by Mr. Frank Latham on the "Supply of Surface and Under-"ground Water to Towns;" and the third, by Mr. J. Hutton on "Electrically-Driven Pumping Plant for Water "Supply, and Storage of Water under Pressure." The papers were interesting and instructive as records of work done; and they afforded a certain scope for criticism. But when the discussions are surveyed, it cannot be said that they increased the sum of professional knowledge. Water-works engineering and water affairs generally do not furnish a large scope for varied and fresh discussion, excepting in respect of details. The general principles of water-works practice and management are now to a large extent stereotyped; and the opportunities for important change and progress in either practice or management are few when compared with such services as gas or electricity. In the case of the two latter, from the works to the point of use—especially in the former—there is a variety of processes, plant, appliances, and methods which gives to the members of the technical organizations a great range of prolific subject-matter. Therefore, in the discussions at the meetings of the water-works engineers—and it must be recognized as unavoidable if some of the papers are not to go unnoticed—one frequently hears the "oft-repeated tale." In view of this, it is not an acceptable notion that Mr. William Matthews advanced in the expressed opinion that a delimitation should be set upon authors in the matter of the subject-matter placed before the members—in this respect, that work which is only on paper and not actually executed should not be permitted a place in written contributions, for the reason that it might never be carried out, or, if it is, might be varied in important details. Safe as Mr. Matthews is as a leader in opinion on matters pertaining to his profession, we cannot admit his wisdom on this point. Upon the very matter that he would reject, we see a profitable opportunity for debate; and if subsequently, too, a prospective scheme that has been brought before the members is varied in body or detail, the reasons for those variations would supply the material for a second useful contribution. However, Mr. Matthews's view in this regard did not find sympathetic support; and therefore his retrograde suggestion is not likely to be acted upon.

The general business only consisted of the appointment of the officers for next year and the election of new members. Mr. Bancroft's successor as President is Mr. P. H. Palmer, of Hastings; and therefore it is probable that the summer meeting will be held at that popular seaside resort. The Vice-Presidents are Mr. William Millhouse, of Scarborough, and Mr. C. Sainty, of Windsor. There were four new members added to the roll, and ten associates. It is a good sign to find the Association attracting so freely the younger members of the profession, and to see the active interest they are taking in the work.

The Cost of the London Water Undertakings.

When dealing, in the "Journal" for the 29th ult., with the last of the awards made by the Arbitrators under the Metropolis Water Act, 1902, we mentioned that the £6,534,000 allotted to the New River Company brought up to £30,662,323 the total in cash which the Water Board were paying for the undertakings of the eight Metropolitan Water Companies, and that the equivalent of water stock at £91 6s. 6d. would be £33,575,243. The above-named sum is, of course, exclusive of the debenture debt, which entails a charge of about £300,000 a year. Some additional light is thrown upon this important financial transaction by the tabular statement accompanying the report of the Special Arbitration Committee presented at the meeting of the Water Board last Friday, and reproduced, with the portion of the report bearing upon it, in another part of the present issue. It will be seen therefrom that, in addition to the £30,662,323, there are redeemable and irredeemable stocks amounting respectively to £7,217,838 and £4,365,110, and that there is a mortgage in existence to the extent of £42,000, at 3½ per cent., in the case of the Kent Company. This brings up the total loan capital issued at the appointed day (the 24th of June last) to £11,624,948. The Committee point out, however, that the £33,564,281 awarded does not represent the total amount of stock issued in respect of the transfer of the undertakings; account having to be taken of expenditure in connection with the arbitration, the issue of the stock, the compensation to the Directors, and other matters. The total of these outgoings is not expected by the Committee to exceed £850,000, the equivalent of which in stock, at the average price of the last issue (£92 13s. 8d.), would be £917,266. This brings up the total to £34,481,547. But here the Chamberlain of London's fund comes to the aid of the Board, inasmuch as it will act as an abatement of the compensation payable by them to the Water Companies. When all the payments due to this fund up to the appointed day have been made, they will represent approximately £200,000 in the water stock. This will reduce the £34,481,547 to £34,281,547. The annual charge for interest on this amount of stock will be £1,028,446; and we will now see how the Committee propose to meet it.

It will be seen from the statement already alluded to that the profits distributed by the Water Companies in the shape of dividends in the year 1903-4 amounted to £1,079,078. The Committee point out that, when allowance has been made for payments to the Chamberlain's fund and to the Directors, this total will compare with the annual charge to be met by the Board on account of the water stock issued in respect of the transfer. Putting the payments referred to at £40,652 and £32,538 respectively—making together £73,190—we get a total of £1,152,268. Out of this will have to be paid the above-mentioned sum of £1,028,446 for interest on the stock, as well as the annual cost of its management and other incidental matters, put in round figures at £29,000; making together £1,057,446. This shows an approximate saving of £94,822. A question will naturally arise as to the payments to sinking or redemption funds for the extinction of the stock. The Committee anticipate this by pointing out that Parliament relieved the Board of these payments for the first twenty years of their existence. They also call attention to the fact that the awards of the Arbitrators were based upon anticipations of future additional profits. Should these be realized, the profits that will accrue to the ratepayers will, of course, be proportionately increased.

It is early yet, however, to talk about realizing greater profits, as it is not clear how this object is to be achieved. The Committee look hopefully to concentrated management to effect substantial economies; and they are no doubt justified in doing so. But it must be borne in mind that there will be various outgoings to counterbalance these savings. The transfer of the water undertakings has been a costly business—involving altogether an outlay of rather more than £43,000,000—and it may be some little time before any substantial benefit accrues therefrom. The Board are new to the work of managing the water supply of London; and although they have the advantage of the assistance of some of the ablest officials of the Water Companies, they cannot be expected to carry out any great reforms at this early stage of their existence. They must get their financial position clearly defined, so that they will know exactly what will be the demands on their resources. When they find themselves with a substantial balance on the right side, they will be able to consider the best way of utilizing it. To attain this end, they must exercise all the economy consistent with the efficient administration of the undertakings they have acquired. If this is done, as no doubt it will be—indeed, evidence of it has already been afforded—the ratepayers of London will not have cause to regret that they have obtained possession of the water-works, even though they have had to pay for them rather more than they were led to expect.

At the monthly ballot of the Institution of Civil Engineers last Tuesday, Mr. S. H. Stelfox, B.Sc., of Belfast, was elected an associate member.

Mr. Corbet Woodall, who has been away in South Africa on professional business since early in October, left for England last Wednesday, in the *Briton*, which is due to reach Southampton on Christmas Eve.

NOTES FROM EARL'S COURT.

THERE is no cessation of interest in the Exhibition—the same tale of success has to be recorded. Not only are those having the management of gas undertakings and those in official capacity prominent among the visitors, but the general public continue to make their interest clear by the force of numbers. Gas committees and directors, too, are day by day taking advantage of the gas exhibition in informing their employees, by personal observation, of the best and latest that the manufacturers of plant and lighting and heating appliances have to offer. The effect of all this enlightenment and education of gas-works employees will be without bound. In pursuing his daily work, the employee who is well informed on the latest improvements carries a vast amount of influence among the consumers. Notable examples of giving employees opportunities of visiting the exhibition have been referred to in previous issues. A succeeding note shows that the Birmingham Corporation Gas Department have exceeded anything that has yet been done in the matter of bringing their men into the presence of this great illustration of the power and possibilities of gas. The Cambridge Gas Company, too, supply another from many that might be given as examples. We learn from the Engineer (Mr. James W. Auchterlonie) that they sent up about forty of their officials, foremen, and fitters, as well as representatives of the local Press, in which, by the way, the Company are advertising and offering free tickets.

A Reminder.

The Exhibition closes next Saturday night; so that few days now remain for those who have not yet been to see what may be for several years to come a gas exhibition of unrivalled magnitude and splendour.

The Visit of Continental Engineers.

The event of the past week was, of course, the visit of the gas engineers from the Continent. The Gas Associations of France, Germany, Belgium, Holland, and Italy were represented; and the success of their visit was marked by the gratification afforded them not only by the splendour of the exhibition, but by the hospitable reception accorded by their British *confrères*. A full report appears on pp. 831-34.

An Exhibition for the North.

On Friday several members of the Manchester Institution of Gas Engineers, as well as of the junior organization of the same district, were at the exhibition. Opportunity was taken by the former (as will be seen by the report on p. 830) to initiate steps to "feel the pulse" of the manufacturers of lighting and heating appliances, and of the gas undertakings throughout the territory covered by the Institution, on the question of holding a gas exhibition in Manchester next autumn. Of course, the resolutions do not bind the Institution to anything until the Committee and the members have had an opportunity of considering the matter. The Committee will meet about, or soon after, the middle of January; and therefore it is hoped that all recipients of the circulars which are to be sent out will assist them by letting the Hon. Secretary (Mr. H. Kendrick, of Stretford) have a response as early as possible. Then the meeting of the Institution will be held in February; so that the whole matter as to whether an exhibition is to be held, under the auspices of the Institution, will be speedily settled. This will give ample time for the exhibitors to make their arrangements for the autumn. Meanwhile, it will be noted that the question of the method of organizing the exhibition has been left quite open. There are some counter suggestions before the Institution—whether, for instance, they shall undertake the work direct with a salaried organizing manager, or whether the whole affair shall be placed in other hands. Regarding the latter suggestion, Messrs. Bridges and Smith have already offered their services. It is, however, probable that the result of the inquiries which are to be at once made will assist the Committee, if the general members endorse the proposal to hold an exhibition, in determining which method shall be favoured. Meanwhile, it is stated that an attempt may be made—depending on the decision of the Manchester Institution—to hold an exhibition in Glasgow next year. The attempt, we are of opinion, would be futile if an exhibition is at the same time being organized under the auspices of the Manchester Institution.

A Brilliant Recognition by Birmingham.

Last Tuesday, the day when the Continental Gas Engineers were at the exhibition, it was noticed that there were large groups of men intently inspecting the exhibits in company; and a desire for information disclosed that they were the employees of the Birmingham Corporation Gas Department. Inquiry of Mr. Henry Hack, the Chief Engineer, shows how fully the Corporation Gas Committee have recognized the educative advantages offered by the exhibition to men employed in gas-fitting work. A few weeks since, he informs us, the Secretary of the Gas Department (Mr. G. Hampton Barber) suggested to the Gas Committee that it would be to the interest of the department to allow a good number of the gas-fitters in their employ to visit the exhibition, believing that it would not only be beneficial to the men, but, by the information they would there gain, also to the department. The Committee readily acquiesced in the suggestion; and arrangements were made with the Great Western Railway Company for a special train to take them from Birmingham to West Brompton—close to the exhibition. The men were conducted free of expense; their railway fares, all charges for food, &c., for the day being defrayed by the department, together with the day's pay. The number who went from the fittings branch at the Council House was about 100. These were in charge of Mr. S. R. Barrett, the Fittings Superintendent, and five of his foremen. As the offer was extended to fitters and others engaged on gas apparatus at the works, 27 men from the works also availed themselves of the offer; and these were placed under the guidance of Mr. G. Ball, one of the inspectors of mains and services. The parties were conducted round in numbers of about 25 in each. The train left Birmingham at 8.15, arrived at West Brompton at about 11.30, and left the exhibition at 7.30, arriving at Birmingham again at about 11 p.m. From a note which Mr. Hack has received from Mr. Ball, it is clear the men were much pleased with their visit, and had every reason to be thankful to the Committee for giving them the opportunity of viewing such a splendid display. Mr. Ball's letter was as follows: "On the return journey from the Earl's Court Exhibition the men who formed the works' party asked me to convey their best thanks to the Committee for their kindness in granting them the opportunity of visiting the exhibition; also for the comfortable arrangements made for the journey. They also wished me to thank you for your kindness in recommending them to go. I should like to add to this that they examined the different exhibits very minutely, and were very pleased with the exhibition; and I feel sure that they have gained experience by their visit. Of course, the conveyors and general machinery connected with the manufacturing plant were the most interesting to the majority of the men from the works; while the gas-fitters paid very great attention to the explanations given them of the general lighting arrangements."

The foregoing does not complete the interest shown by the Birmingham Corporation Gas Committee. Most of the members, including the Chairman (Sir Halliwell Rogers), together with Mr. Hampton Barber and Mr. Hack, spent the evening of the 24th ult. there and most of the following day. Further, the Committee voluntarily offered the opportunity of a visit to the works' engineers, the analysts and assistants, and the general foreman, at the expense of the department, and naturally all availed themselves of it—the only condition being that all the officers should not be absent at the same time. At the end of his letter replying to our inquiry, Mr. Hack says: "I hope that most of the authorities dealing with gas undertakings have had like consideration towards their servants; for be the man ever so dull, he cannot come back without retaining some valuable information which should be of lasting value to not only himself, but his employers." While in town the Gas Committee visited the high-pressure lighting at London Bridge towards midnight on the 24th, and were all much pleased with it.

A Relic.

Anything which has a personal association with the gas giants of the early days of the gas industry has an interest for present-day engineers. At the stand of the Parkinson branch of Messrs. Parkinson and W. & B. Cowan, Limited, may be seen a letter in the handwriting of Samuel Clegg, addressed to Mr. Samuel Crossley, of No. 15, George Street, Mansion House, on Aug. 12, 1818. Apart from its personal association, the letter will be interesting, in connection with its reference to certain cities, and to the use of gas-meters. It reads—

> Sir,—I feel myself much obliged to you for your attention to my letters. I am subpœnaed to attend a trial at Bristol; the Gas Company there being indicted for a nuisance in consequence of not having our firm's machines [meters]. The conversation at the Committee yesterday was entirely about the meters; and I think they begin to see the necessity of them. One of them is deputed to go to Manchester and Birmingham. I gave them Whitworth's address. Of course we shall hear from them when this person returns. Respecting Aldgate Company, I cannot make any alterations different from the first proposal. I wish you would send a 10-light meter and one 5-light to Chester as soon as you can, with one dozen governors carefully packed.
>
> *Aug.* 12, 1818. Yours, &c., S. CLEGG.

A Fire-Clay Gas-Main.

The Cambridge Gas Company, through their Engineer and Manager (Mr. J. W. Auchterlonie), have sent an exceedingly interesting contribution to the loan section; and gas engineers should not miss it, as it is certainly a historic curiosity. It is a short length of old fire-clay street main, which was laid down in Cambridge previous to 1840 by Mr. John Grafton, at that time Engineer to the Company. In all, there was about ½ mile of this main laid; and the relic represents a portion of it.

Cookery Lectures.

The cookery lectures in the past week continued to attract considerable audiences. Miss Ada Ball, whose name is familiar to our readers, was the capable exponent of the high art; and she was greatly applauded on Saturday when, in bringing her

series of lectures to a close, the Chairman of the Advisory Committee (Mr. J. W. Helps) presented her with a basket of choice flowers. Miss E. A. Springthorpe is conducting the demonstrations this week.

Quick-Cookery Competitions.

If asked now what is the most attractive feature of the gas exhibition to-day apart from the exhibits, the answer without hesitation would be the quick-cookery competitions. It is really marvellous how they have taken hold of the public fancy; and the competitors themselves are as keen as they can be in the matter. We are not so sure, however, that it is so much the prizes as the certificates that they value the greatest. The certificates must prove very useful to them in the future; and coming from the International Gas Exhibition of 1904, they will be a somewhat rare possession. This week there will be an exciting time among those who have thus far carried off the laurels. These are going to be pitted one against the other on Friday and Saturday; and so there will be a battle royal to come out top in this the crowning event. As to the competitions last week, the breakfast menu was: Coffee (ground), broiled kidney, fried potatoes, two pieces of toast, and three pieces of bread and butter. The luncheon menu: Steamed cod and egg sauce, Cornish pasties, apple fritters, and cheese toast. The winners in the breakfast competition were (1) Mrs. Hitchins, (2) Miss Wooder, and (3) Miss Lennard. The record time, by Mrs. Hitchins, was $7\frac{1}{2}$ minutes. The winners in the luncheon competition were: (1) Miss Lovel Wright, (2) Mrs. Smedley, and (3) Miss Farrow. Mrs. Smedley succeeded in regard to record time; only occupying $18\frac{1}{2}$ minutes. But Miss Wright, who was adjudged the winner of the first place, and whose time was 20 minutes, scored over Mrs. Smedley in respect of quality. In fact, Miss Wright has to her credit the highest number of marks so far recorded. As to the children's simple breakfast competition, the successes were: (1) Florence Housgo, aged 14 years, 10 minutes (Baroness Burdett Coutts' School); (2) Mary Townsend, aged 14 years, $11\frac{1}{2}$ minutes (St. Matthew's School); (3) Alice Beer, aged 13 years, $11\frac{3}{4}$ minutes (Wesleyan Upper Grade School); and (4) Florence Bragg, aged 13 years, 13 minutes (Baroness Burdett Coutts' School).

Junior Institution of Engineers.

Last Saturday, on the invitation of the Chairman of this Institution (Mr. Samuel Cutler, jun.), a large number of the members visited the exhibition—Mr. J. W. Helps, Mr. S. Y. Shoubridge, Mr. A. E. Broadberry, and Mr. A. W. Onslow kindly conducting them round. The greatest interest was evinced in all that was to be seen. Subsequently the members were entertained at tea. In the course of a few remarks, the Chairman expressed the pleasure he felt at seeing such a large gathering, and said that no doubt the exhibition had proved an eye-opener to many of them, as indicating the important position to which gas had attained. He drew comparisons between the electric arc light and the intensified high-pressure gas-lamp, the incandescent electric lamp and the incandescent gas-burner, and referred to the production of electricity by means of gas-engines. He pointed out how, for all heating and cooking purposes, gas practically stood unrivalled; electricity being hardly used at all in those directions. Mr. Cutler alluded to the honour which Mr. Helps had conferred upon the Institution in being present, and expressed the hearty appreciation of the members for the kindness which he and the other members of the Advisory Committee had displayed in so ably conducting the visitors over the Exhibition. Mr. Helps, in replying, said he had been much gratified in meeting the members of the Institution. He did not by any means regard electricity as a fierce competitor, but looked upon it more as a friend, as, by its introduction, gas engineers had been made to "wake up," and the present healthy condition of the industry, as demonstrated by the exhibition, showed how successful gas had become in numerous ways. He took occasion to refer to the opportunities which the gas profession presented to the young engineer who was considering what department of work to take up. In the application of gas to power purposes alone, there would, he felt sure, be enormous developments in the near future. On the proposal of Mr. Kenneth Gray, Past Chairman of the Institution, the thanks of the members were conveyed to Mr. Cutler for his invitation and hospitality. He also referred, in appreciative terms, to the courtesy shown by the gentlemen who had acted as guides, and to the trouble which they had taken throughout the afternoon to explain so clearly the construction and uses of the various appliances, &c. In conclusion, he said that, as a heating engineer, he did not feel at all afraid of gas as a competitor, as he had in going round the exhibition acquired a headache which, he believed, must be due to the effects of the gas-fires in operation, so that that system of heating would hardly appear to be a desirable one to adopt. This observation immediately brought Mr. Helps to his feet to declare that, although he was particularly subject to headache, and had altogether spent some days in the exhibition, he had never experienced the complaint to which Mr. Gray had referred. He was still waiting for that headache. (Laughter.) Properly fitted appliances for heating by means of gas undoubtedly gave satisfaction in every respect. The party then dispersed, and the members further examined individually those exhibits containing features of special interest, according to the particular branch of engineering in which each was occupied.

The Settle-Padfield Vertical Retorts.

Judging from the large number of engineers who have made a special inspection at the exhibition of the model of six retorts on the Settle-Padfield system, interest is still very much alive in the system of carbonizing coal in vertical retorts. Many Continental engineers have availed themselves of this opportunity of getting a full description of the working of the Settle-Padfield process. Just recently a visit was paid to Exeter by Mr. Sissingh and the Chief Chemist (Mr. P. H. Hendriks) of the Rotterdam Gas-Works; and last Thursday Mr. C. T. Salomons and Mr. A. Van der Wielen, also of Rotterdam, both went down. They saw in operation the bench of six retorts. Charges were drawn; and the feeding of coal was watched with very keen interest. The process on the whole won the admiration of the visitors. Negotiations, we understand, are at present in progress for the erection of benches on this system in France, Germany, Russia, Holland, and the United States, as well as several in England. The following analyses made by Mr. P. H. Hendriks, of Rotterdam, has been sent to Mr. T. Settle:—

Slack Coals Used in Vertical Retorts at Exeter.

	A. Per Cent.		B. Per Cent.
Water	1·55	..	1·05
Volatiles	24·30	..	23·70
Carbon	55·65	..	56·40
Ashes	18·50	..	18·85
	100·00		100·00

We have received a splendid sample of coke which was taken from the retorts last Thursday in the presence of Mr. Salomons and Mr. Van der Wielen.

A New Inverted Burner.

Moffat's, Limited, have introduced on to their stand what they are calling the "K" inverted incandescent gas-burner. It is a new thing; and they have hurried a few samples along to the exhibition in order that visitors may have an opportunity of inspecting them before the close. In consequence, the burners are only roughly finished, but they answer the purpose. The idea of the burner, in one respect, is not altogether new as applied to ordinary mantles; but we do not remember to have seen either it or another special feature applied to inverted burners before. The burner is shaped in this fashion ⌐; the gas-nipple and the air-inlets, with the mixing chamber, being at the end of the tube where junction is made with the gas-fitting. Carried from underneath the horizontal portion of the tube is the globe-holder; and the effect is that the gas and air mixing chamber is removed completely away from the direct current of the products of combustion—in fact, there is no metal work above the globe at all, excepting the curved tube conveying the combustible mixture. For the regulation of the air supply, an adjustable collar is provided; and as it is out of the range of the heat, regulation can be performed without burning the hands while the lamp is in use. Inside the ignition end, the tube is slightly bell-shaped; and this results in the spreading of the flame to such an extent that it will fill a 2-inch diameter mantle. Certain it is that all the inverted lamps which Moffat's are showing at Earl's Court contain mantles perfectly incandescent. It is asserted that the photometrical tests give 90 candles for a consumption of 3 cubic feet of gas. This is a high efficiency. The burners are being made in both bronze and brass; and a feature we had almost forgotten to mention is the difficulty of making them light-back. The greater the difficulty in this regard, the better.

An Absence of Tools.

A letter, signed C. H. Nott, appearing in the "Ironmonger," furnishes a hint for future gas exhibitions. In the course of it, he says: "One thing appears to have been forgotten—viz., the tool department. I saw only one firm showing tools for the gas-fitter. Now I think this is a mistake, for how could all the appliances shown be fixed without tools? No doubt hundreds of men will visit the show who will want to see the latest in tools, and to purchase some; but they will be disappointed, as I was."

The Ventilation of the Ducal Hall.

The question of ventilation in the Ducal Hall has been a very real grievance. The conditions, where practically every exhibitor was wanting to show lighting and heating appliances in use, were exceptional, and should certainly have been dealt with as such by those responsible. Complaints, in the absence of any remedial measures being taken, reached us from several quarters; and the allusion to the matter may have the effect of proper precautions being taken on future occasions. One correspondent, referring to the paragraph on the subject in last week's issue, writes: "I have not at hand a copy of the letter addressed to the managers of the exhibition on the subject of ventilation, or I would forward it to you. It was a polite communication, and was signed by some 30 persons—principals and representatives of practically all of the firms exhibiting in the Ducal Hall. It was not replied to until three days after it was presented. The reply stated, in

effect, that their technical advisers were of opinion that nothing could be done, and nothing has been done. As a result, at times the conditions for those who are on constant duty are almost unbearable. Several men in our section have been away for days through illness—largely affected by the products of combustion, and practically all have complained strongly. Many of the signatories are themselves experts on the question of ventilation; and, of course, elementary knowledge assures one that the large volume of gas consumed without practically any overhead outlets could only produce one result. Messrs. Bridges and Smith it is agreed by all I have spoken to are excellent organizers. But in this particular matter, they have given us scant attention; and they seem to resent its being pointed out."

The Provincial Press and the Exhibition.

The hint as to gas suppliers arranging for a visit of their local press representatives to the exhibition has produced a remarkably fine crop of press notices in the provinces. Several papers have reached us containing articles on the display; and most of them well and attractively written. If one or two of the articles may be singled out as possessing exceptional excellence, and showing a keen appreciation of the value of the show and of its popular side, one in the "Eastbourne Chronicle" and another in the "Newmarket Journal" should be mentioned. In securing these, Mr. John Hammond and Mr. J. H. Troughton respectively were no doubt the moving spirits.

SUGGESTED GAS EXHIBITION FOR THE MANCHESTER DISTRICT.

The Question of Direct Organization.

There was an informal meeting of those members of the Manchester District Institution of Gas Engineers who were at Earl's Court on Friday afternoon, for the purpose of conferring with the President (Mr. H. Townsend) and the Hon. Secretary (Mr. H. Kendrick) on the subject of whether steps should be taken to ascertain the amount of support the Institution are likely to receive in connection with the proposal to hold a gas lighting and heating exhibition in Manchester, in order that the matter might be laid before the Committee for their discussion, and ultimately before the members for final determination.

The PRESIDENT said that, arising out of the remark made by Mr. Whatmough at the last meeting in regard to a Gas Lighting and Heating Exhibition being held in Manchester, he had received the following letter from Messrs. Bridges and Smith, the Organizing Managers of the Earl's Court Exhibition:—

DEAR SIR,—We understand that many of your members have expressed the wish that a similar exhibition to the present might be held in Manchester in 1905.

No doubt, in view of the immense population of Lancashire, Yorkshire, and the North, and the large number of factories and other establishments where gas power ought to supersede steam, it would be of very considerable benefit to the gas industry generally if the latest developments in gas apparatus and appliances for heating, lighting, and power purposes were brought prominently to the front in your important centre.

If it should be considered desirable that such an exhibition should be held, we are quite willing to undertake its organization, and to erect a suitable building for the purpose if required. In the event of the exhibition being arranged, may we have the pleasure of conducting it directly under your auspices, and will some of your members favour us by acting on the Advisory Committee which would be composed of members of various Northern Gas Companies and Committees—we, of course, bearing the entire financial and other responsibilities of the undertaking.—Yours faithfully,

BRIDGES and SMITH.

Continuing, the President said this letter only reached him the previous day; and so he had simply acknowledged it. At the last meeting of the Institution, he was taken considerably by surprise by the remarks of Mr. Whatmough; and, of course, the Committee had not had time to consider the matter. Therefore they were still, with this letter before them, in the position of not knowing what the idea of the Committee was in the matter.

Mr. C. POTTS (Hyde) observed that, of course, the request on Mr. Whatmough's part was quite a reasonable one.

The PRESIDENT agreed; adding that there was no doubt about the Earl's Court Exhibition being a splendid one, and that it would do a great deal of good to the gas industry. If, however, an exhibition could be organized for next year or some other time in Manchester, it would no doubt be equally beneficial to that district.

The HON. SECRETARY said he ought to state that as soon as he entered the exhibition that morning, he was buttonholed by one of the exhibitors, who informed him that Mr. Smith wished to see him the moment he set foot in the exhibition. It seemed to him rather as though the Organizing Managers wanted to rush this matter through—really to force them before they had had an opportunity of talking over the matter whether or not they should hold an exhibition of this description. He put the matter off by telling Mr. Smith that it had not yet been discussed, excepting informally among the members. The Committee would discuss it, then the members, and probably they would consider it advisable to approach the Institution of Gas Engineers. So far as he was concerned, he could not say that anything would be done without the sanction of these three parties. However, Mr. Smith pressed him for an opinion; and he (Mr. Kendrick) only went to the length of telling him that, in his own opinion, the exhibitors of the heavy machinery would not gain much by going to Manchester. But so far as the heating and lighting exhibitors were concerned, they were required, as it was the gas consumers that the gas undertakings would want to attract. However, he was not prepared to express an opinion to Mr. Smith one way or the other. If, now, they could go before the Committee with a favourable expression of opinion from the members assembled at the exhibition that day, it would help the Committee very considerably. What they wanted to do was to get the matter talked about as quickly as possible among the members, the exhibitors, and the people they desired to reach. The more the thing was boomed, the more likely was it to go.

The PRESIDENT remarked that there could be no two opinions that an exhibition held in Manchester in the autumn of next year—if it was a successful one, if it was anything like the present one—would be very beneficial to the gas industry in their district. Earl's Court was, of course, a long way off; and they could not get consumers to travel such a distance. Although his Company had offered free tickets to the consumers who cared to visit the exhibition, and had advertised it on the hoardings, in the shop windows, and through the Press, he was not aware of a single application from any of the consumers for a free ticket. Now, of course, Manchester would be very get-at-able from their district of Yorkshire; and to gas undertakings in Lancashire the argument would apply with much additional weight. There could be no question, as an abstract policy, that it would be highly desirable and beneficial to have such an exhibition next year. Now what they wanted to hear was first from the exhibitors, on whom the success would depend as to whether they would be prepared to take part in such an exhibition if brought about. If publicity was given to the matter that day, and an expression of opinion of the exhibitors was asked, then he thought it would materially assist the Committee to come to a decision.

Mr. W. S. HADDOCK (Warrington) pointed out that there were many manufacturers in the North who were not at Earl's Court who would want to exhibit; and there were many at Earl's Court who would not go North. It would not do any harm to send a circular to all likely exhibitors to see whether they would be willing to help, and also to the members to inquire if they would do anything to assist. He was afraid they would not be able to carry an exhibition through without financial aid; if it could be done without, so much the better. After a little further discussion, Mr. Haddock moved—"That the exhibitors of the Earl's Court Exhibition, as well as other likely exhibitors, be circularized by the Manchester Institution to know whether they would be willing to take part in an exhibition in the autumn of 1905 at Manchester."

The PRESIDENT remarked that what they were now suggesting was that the Manchester Institution should take the preliminary steps, so as to give the Committee something to work upon.

Mr. POTTS was of opinion that the thing would pay for itself, without any financial help.

The HON. SECRETARY pointed out that it might be decided to engage an Organizing Manager at a fixed salary to do the whole work for them. They did not want to think of failure, but there would have to be a guarantee fund in case of accident. They must look the possibility of that in the face.

The PRESIDENT said that, of course, when the matter came before the Committee, the offer of Messrs. Bridges and Smith to take the whole financial responsibility would be looked into. They would have to consider the replies from the exhibitors together with the letter from Messrs. Bridges and Smith. Of course, the steps would be taken which would involve the Manchester Institution in no financial obligation.

Mr. J. H. BREARLEY (Longwood) suggested that the exhibitors might be invited to express an opinion as to the date they would prefer the exhibition to be held.

Mr. HADDOCK thought it should be in the autumn, so as to come on just before the lighting season.

Mr. BREARLEY certainly considered it should not be earlier, so that gas heating could be demonstrated to advantage.

The HON. SECRETARY said he understood the proposal was that he should issue a circular asking the exhibitors at Earl's Court, and any other likely exhibitors, if they would be prepared to hold an exhibition in Manchester in the autumn of 1905, under the auspices of the Manchester Institution of Gas Engineers; and at the same time invite suggestions as to the conditions on which they would be prepared to hold such an exhibition. The replies would give the Committee something to consider at the meeting which would be held about the third week in January.

Mr. HADDOCK adopted this suggestion as his proposition, and Mr. J. E. LAMB (Altrincham) having seconded, it was unanimously carried.

On the motion of the PRESIDENT, seconded by Mr. W. HILL (Stalybridge), it was further agreed to send out circulars to every gas undertaking in the district of the Manchester Institution, asking whether they would be prepared to support the proposed exhibition, and for any suggestions on the project.

VISIT OF CONTINENTAL GAS ENGINEERS TO THE INTERNATIONAL GAS EXHIBITION.

A Memorable Day.

TUESDAY was a day of extraordinary importance at the International Gas Exhibition; and Earl's Court was more completely internationalized on that day than it has been since the opening, or is likely to be again before the close, of the exhibition. It was the day when the delegates appointed by the various Continental Gas Associations, at the invitation of the Institution of Gas Engineers, paid their formal visit, and were the guests for the day, of their British brethren. France, Germany, Holland, Belgium, and Italy were severally represented.

The invitation card appointed 12.45 as the time for meeting in the Lecture Hall at the exhibition; but early morning saw many of the visitors passing through the turnstiles, with the view of making the most of their visit in inspecting what the British gas industry had accomplished in the way of an up-to-date gas exhibition. The interest the visitors showed during the morning and throughout the afternoon in all that was to be seen was of the liveliest; and measuring the impression made on them by their expressed satisfaction and congratulation, which was of the most cordial, it was deep and complete.

THE RECEPTION AND LUNCHEON.

However, just before a quarter to one, the lecture hall presented a striking and animated scene. The President of the Institution (Mr. D. Irving), the President of the Exhibition (Mr. H. E. Jones), and the Hon. Secretary of the Institution (Mr. J. W. Helps) were receiving their guests; and introductions were being made and old-standing friendships renewed. There were a few members of the Institution present; but not so many as we should have preferred to see on such a unique occasion. In addition, the Institution of Civil Engineers had a representative present, who is a link between the gas specialists of that body and the other sections of engineering, in the person of Mr. Charles Hawksley. Looking round, one quickly recognized the genial countenance of M. Visinet, the President of the Société Technique; Herr Körting, a veteran in gas engineering, and as hearty, vigorous, and alert as of many years since, and the well-esteemed President of the German Association; M. Brandt, the President of the Belgian Association; Heer Bolsius, the President of the Dutch Association, and the Editor of our always acceptable contemporary "Het Gas;" and Signor Ugo Della Casa, the delegate of the Italian Association. Several of the Imperial Continental Gas Association Engineers were among the company; but we need not designate them here, as a complete list of visitors present at either the luncheon or dinner, or both, is given below. Suffice it to say here that the party was a large one, and representative of Continental gas engineering talent. If one exception be made, it is mention of the name of M. De Brouwer.

After the reception, luncheon was served in an adjoining hall, which was draped and otherwise decorated, and large printed greetings adorned the walls. Behind the President's table appeared "Wilkommen Deutsche Ingenieure," "Aux Gaziers d'Outremer," and "A l'Industrie Internationale du Gaz." On one of the side walls was "Welcome to our Visitors from Across the Sea," and facing it on the other was "A l'Entente Cordiale des Gaziers de Tous Pays." At the luncheon, the President (Mr. Irving) was in the chair; and during its progress and afterwards, a selection of music was performed by, and songs rendered by individual members of, the Cairo Orchestra.

Luncheon ended, the President announced that it had been decided to dispense with a toast list, seeing that they hoped to have the pleasure of dining together in the evening; and then they could make whatever speeches, or drink whatever toasts, they felt inclined to. Notwithstanding, he could not refrain from taking this the earliest opportunity of offering, in the name of the Institution of Gas Engineers, to all their visitors from abroad, a most sincere welcome to the exhibition. They were delighted to receive that morning representatives from France, Germany, Belgium, Holland, and Italy, and from the Colonies—not excepting even Australia. The Institution were proud to receive them; and he would only further, for the present, express the hope that they would all enjoy their visit, and that they would see much in the exhibition to interest and possibly to edify.

Some announcements were made by Mr. Helps which were translated for the benefit of those who did not appreciate them by Mr. H. Salomons, the Engineer of the Brussels works of the Imperial Continental Gas Association.

The whole afternoon was spent in further inspection of the exhibition; the visitors making their tour as they pleased, being accompanied by three or four of the English members who were in a position to impart information to those who were unable to make inquiry in the English tongue. Prominent among theso who were able to render this service was Mr. C. E. Brackenbury, of the Continental Union Gas Company. The afternoon was pleasantly and instructively spent in a complete inspection; and at a quarter-past five carriages were at the main entrance to convey the visitors back to their hotels.

THE LIST OF THE VISITORS.

It will be convenient here to present a list of those who were at either the luncheon or the dinner, or at both functions.

SOCIÉTÉ TECHNIQUE DE L'INDUSTRIE DU GAZ EN FRANCE.

VISINET, M., Paris (*President*).
THIBAUDET, M. (*Secretary*).*
PAYET, J., Paris (*Secrétaire-Archiviste*).
BOUTON, M., Lyons.
FREYSS, M., Union des Gaz, Paris.
GODINET, M., Lyons.
GARDINER, R. S., London.
JEFFREY, M.*
ROUGET, M.

* These names were on the lists; but there is a little uncertainty by our representative as to their presence.

GERMAN ASSOCIATION OF GAS AND WATER ENGINEERS.

KÖRTING, Herr, Hanover (*President*).
DRORY, J., Aix-la-Chapelle.
KROMSCHRODER, Osnabruck.
LEYBOLD, Dr. W., Hamburg.
SCHAEFER, Dr., Dessau.

DUTCH GAS ASSOCIATION.

BOLSIUS, P., Bois-le-Duc (*President*).
DOESBURGH, N. W. van, Rotterdam (*Secretary*).
SALOMONS, C. T., Rotterdam (*Vice-Secretary*).
FRANKEN, J. H., Antwerp.

Extra-Ordinary Members—

ABADY, J., London.
ENGEL, C., Amsterdam.
GOLTHEM, van, Bergen-op-Zoom.
HARMSEN, B. J., Rotterdam.
POT, F., Rotterdam.
WIELEN, M. A. van der, Rotterdam.
WILSON, G., The Hague.
WILSON, G., jun., The Hague.
ZELLEKENS, A., The Hague.

BELGIAN GAS ASSOCIATION.

BRANDT, E., Brussels (*President*).
BOSCHERON, A., Liege.
BUSINE, L., Mons.
DE BROUWER, M., Bruges.
ESCOYEZ, L., Tertre-lez-Badour.
GENNOTTE, E., Schaerbeek.
LECLERCQ, F., Verviers.
POHL, A., St. Ghislain.
PRISSE, E., Brussels.
RIGAUX, H., Brussels.
SALOMONS, H., Brussels.
TRICOT, C., Mons.
TRIFET, A., La Louviére.

ITALIAN GAS ASSOCIATION.

DELLA CASA, UGO.

OTHER GUESTS AND MEMBERS OF THE INSTITUTION OF GAS ENGINEERS.

IRVING, D., Bristol (*President*).
JONES, H. E. (*President of the Exhibition*).
HELPS, J. W., Croydon (*Hon. Secretary*).
DUNN, W. T., London (*Secretary*).
ALLEN, E., Liverpool.
AUZÉPY, P. T. B. T., Consul-General for France.
BRACKENBURY, C. E., London.
BROADBERRY, A. E, Tottenham.
CHAPMAN, J. L., Harrow.
COATES, J. (President, Ottawa Gas Company).
COLMAN, Dr. H. G., London.
GOODENOUGH, F. W., London.
GOULDEN, T., London.
HEPWORTH, J., Edinburgh.
HUNT, CHARLES, London.
HUTCHINSON, W. W., Barnsley.
HUTCHINSON, CHARLES H., Barnsley.
JONES, R. HESKETH (Chairman, European Gas Company).
MARSHALL, F. D., London.
ONSLOW, A. W., Woolwich.
SHOUBRIDGE, S. Y., Sydenham.
THOMPSON, R. O., Melbourne.
WARREN, H. G., (Secretary, Danish Gas Company).
WEBBER, W. H. Y. (Secretary, Institution Advisory Committee).
WEST, J., Manchester.
WILLIAMS, W. (Secretary, European Gas Company).
WILSON, R. W. (Secretary, Imperial Continental Gas Association).
WOODALL, H., Westminster.
WOODALL, H. W., Bournemouth.

Mr. F. Richardson (President) and the Hon. H. T. Cady, of the New England Gas Association, who had come from America to visit the Gas Exhibition, wrote to express their apologies that the tour they wished to make before their return to America (which they desired to reach again before Christmas) precluded them fulfilling their intention of being present on this occasion.

DINNER AT THE HOTEL CECIL.

The dinner in the evening, at the Hotel Cecil, was the big social event of a long-to-be-remembered day; and there was a large and representative company, comprising most of the above gentlemen—a larger number than there were at the luncheon at Earl's Court. The utmost heartiness and reciprocal regard

pervaded the function. The President of the Institution (Mr. D. Irving) was in the chair; and on his right were: Herr Körting, Mr. R. W. Wilson, M. Brandt, Mr. H. Salomons, and others. On his left were: M. Visinet, Mr. H. E. Jones, Heer P. Bolsius, and others. During the evening, under the direction of Mr. James A. Brown, songs were rendered by Miss Elsie Emlyn, Miss Edith Nutter, and Mr. Ben Grove; and the Continental visitors were loud in their approval of the vocal capabilities of the artists. The whole, in fact—dinner, music, and speeches—combined to make the most felicitous of evenings. The general feeling was aptly expressed by one gentleman from Germany when he said to Mr. Helps at the close, "I would not have missed this evening with you if the journey to be here had been ten times as long."

The loyal toasts were first honoured; the whole of the guests respectfully standing during the singing of the National Anthem.

The Continental and American Gas Associations.

Mr. Charles Hunt (London) said the toast he had the honour to propose was one the importance of which he felt he could not over-estimate. It was that which heartily welcomed and wished prosperity to the Continental and American Gas Associations. The Institution of Gas Engineers were honoured on this occasion by the presence of representatives of no fewer than five Continental Gas Associations—those of France, Germany, Holland, Belgium, and Italy. They were, in addition, honoured by the company of representatives of their Colonies—of Canada in the person of Mr. John Coates, and of Australia in the person of the Engineer of the Melbourne Gas Company and well-esteemed friend Mr. Thompson. The gathering might therefore be regarded as thoroughly International. The British gas profession owed a great deal to their Continental brethren in the shape of hospitality. There were few, if any present, in that room who had not—he was now speaking of the members of the Institution of Gas Engineers—at some time or other experienced hospitality from their professional brethren on the Continent. His own earliest experience was that of 1878, when the then British Association of Gas Managers, greatly daring, paid a visit to Paris. That was the first time, he thought, that an English Gas Association had ever ventured on foreign land. He need not say that they by no means repented of their effort; for they were received with open arms by their French brethren, and were entertained with most kind and lavish hospitality, which was repeated on two other occasions—at the Exhibitions of 1889 and 1900. On each occasion the greatest kindness was shown to them; and everything was done for their comfort and, he might add, enjoyment. British gas engineers had also experienced very great kindness from their German brethren. Those who were fortunate enough to visit Berlin a few years ago, could bear testimony to the great kindness and hospitality they then received, not in Germany only, but also in Belgium and in Holland. But they owed something more to the Continent—something more material than hospitality; and they were glad indeed to be able in some small measure to repay, though very imperfectly, the debt they owed. They were still more glad to be able to welcome their friends to an exhibition in which was shown so completely and effectively the capabilities of gas. To that exhibition their friends were most important contributors, if not of actual exhibits, at all events of the ideas of which it was a practical illustration. The British gas industry owed to the Continent the modern gas-engine, which had increased gas consumption so largely during recent years. They also owed to them the regenerative gas furnaces, now almost universally used in gas-works, and examples of which, of English adaptation, were to be seen in the exhibition. They owed to them some most useful labour-saving retort-house appliances, with which the name of M. De Brouwer was associated. More important than all, they owed to the Continent that which enabled them to compete successfully with electricity. He referred to the invention of the Welsbach incandescent mantle. There were also other things which he could mention for which they were indebted to the Continent. But the list was already a fairly full one. He was sure that they would heartily join with him in welcoming their brethren, and in expressing to them the hope (which all his fellow-members of the Institution shared) that this gathering might be the cementing of their friendship, and that it might be the precursor of many such meetings. He therefore gave them the health of the Continental and American Gas Associations, and coupled with it the names of M. Visinet, the President of the Société Technique, Herr Körting, the President of the German Association, Heer Bolsius, the President of the Dutch Association, M. Brandt, the President of the Belgian Society, and Signor Ugo Della Casa, of the Italian Association.

M. Visinet, in responding, said that, on behalf of himself and the Société Technique du Gaz, he thanked the President (Mr. Irving), Mr. Hunt, and the members generally of the Institution of Gas Engineers, for the toast offered. But he was somewhat at a disadvantage, inasmuch as he was unable to speak in good English to those present; and if he had not seen on the walls of the room in which they had their luncheon "*Entente Cordiale*," he should not have dared to speak. But he was very glad indeed to tell them how greatly delighted he and his colleagues of the French Society were with the cordiality they had met with, and with the exhibition. Their visit to Earl's Court had been most interesting. There were several things which were quite novel; and many of them were disposed to return to Earl's Court to study still further the apparatus of British manufacture. He drank to the Institution of Gas Engineers and to their President, who had been a very amiable conductor of their inspection of the magnificent collection of exhibits. He also wished to drink to the President of the Exhibition (Mr. H. E. Jones); and he did not forget the Council and the whole body of members of the Institution. (Applause.)

Herr Körting begged also to return thanks in the name of the German Association for the invitation they had received to visit the great exhibition at Earl's Court, for the very kind reception, and for the toast proposed by his old friend, Mr. Hunt, whom he had known for upwards of thirty years. It was with great pleasure that they had come to see this magnificent exhibition, which the promoters were kind enough to call "International," and to see their old English friends and brethren—though the time chosen for the exhibition seemed to have been selected rather to discourage than to encourage the visit of gas managers, especially from the Continent. It was true that gas showed itself best when it was night; and the nights were very long now. But with the lengthening of the night, the responsibility of the gas manager increased; and he did not generally like to leave his works at such a time. However, it was with uncommon pleasure that he and his friends from across the Channel were present. They felt it their duty to come, and to express their cordial sympathy with what their British friends had undertaken to promote and to encourage the industry, and to express their admiration for the way in which they had done it. It was no use trying to conceal it from the visitors that this was not an International Exhibition. It was an English one. What they admired was the ability and the spirit of invention of the English, and of their "force" to take the best of what they could find on the Continent. (Laughter.) But personally he believed the best way of improving international feelings and good relations was to get a knowledge of the best qualities, of the excellent qualities of the head and heart of one's friends and neighbours, and without envy and without jealousy to help one another, or, as British gas engineers called it, "Helps" (laughter), for the progress of the gas industry and for the benefit of mankind. Might he be permitted to mention the name of one whom they missed there among the great number of gas engineers—the name of one who was known throughout the gas industry of the world—that was, Sir George Livesey. It was with the greatest regret that they missed him from their midst that day. It was, he repeated, with the greatest pleasure that he and his friends were present at the gathering; and it would always remain in their memories.

Heer P. Bolsius, as President of the Dutch Association, also made acknowledgment. He remarked that it was with great difficulty that a stranger who knew little of the "beautiful" English language could condense into few words the feelings that his countrymen and himself would express on this remarkable day. The things that had struck them were the magnificence of the successful exhibition, the work of those who had taken charge of its organization, the astonishing accomplishment of the great gas industry of this country, and the great and friendly reception which had been accorded to the guests of the Institution of Gas Engineers. Therefore, in the names of himself and his colleagues, both present and at home, he drank to the prosperity of the Institution of Gas Engineers—to its President and Council, and to all the members of that splendid organization—and to their exhibition.

M. Brandt (speaking in French) remarked that he regretted that day more than ever that he did not possess some knowledge of the English language, in order to endeavour to make all understand how much the Belgian Association and its members present were indebted to the Institution of Gas Engineers for their invitation, and for the cordial welcome—so full of kindly attentions—they had accorded. The beautiful exhibition which they had shown to them possessed a very real interest, not only for gas engineers, but also for the consumers, as it comprised a great variety of appliances of all kinds which were exclusively modern. In the name of the Belgian Association, he congratulated the Institution upon it, and thanked them for having given himself and his friends the opportunity of ascertaining all the improvements which had been effected in the construction of the appliances shown. As they were aware, an International Exhibition would shortly be opened at Liége; and one section of it would be devoted to the gas industry. He therefore availed himself of the present happy occasion to assure those present that they would be very pleased to receive all the Associations represented on this occasion, and particularly the Institution of Gas Engineers. He drank to the prosperity of that Institution and to the health of its President.

Signor Ugo Della Casa, for the Italian Gas Association, observed that he deemed it a great honour to be associated on this occasion with men of such eminence in the gas world, and from every country, in taking part in this visit to the International Gas Exhibition. In every respect, the exhibition was very wonderful; and it was worthy of the masters and teachers of the gas industry. He tendered his thanks to the Institution of Gas Engineers, particularly to its President, and also to the foreign engineers present, for their great cordiality; and then drank to the health of English gas engineers, and to the prosperity of the exhibition.

The President expressed a desire that both Mr. Coates and Mr. Thompson should also respond.

Mr. J. Coates (Ottawa) said that he was glad to have had an

opportunity of visiting the gas exhibition. One of his chief objects in coming across the Atlantic was to do so; and he thought he had learnt a great deal from it. He must say that considerable honour was due to those who had taken such an active part in producing so great a display of machinery and other productions in connection with gas. It was a little bit out of place for an Anglo-Australian-Canadian to respond to this toast for America. Still he could thank them heartily for the Canadian gas engineers, many of whom were members of the American Gaslight Association. He might say he had the honour of entertaining a few weeks ago some members of the British gas industry—Mr. H. E. Jones, Mr. Thompson, and Mr. Botley; and he had hoped to have had Mr. Corbet Woodall and Mr. Hunt, but they were unable to visit Canada. He believed those who did, enjoyed their visit very much. Every Englishman who crossed to America, and every American who crossed to England, carried with him the silken cord of friendship and love. He should carry that silken thread back with him to America; and he should tell them there of the hearty reception they had given that night to the toast of the American Gaslight Association and of the Continental Gas Engineers. He was glad to see, when he entered the room, the gallant French flag, that of the German Empire and of the great Dutch, with that of stolid English John Bull and the up-to-date American, all hanging side by side. He hoped and prayed they might long hang side by side, under the same sunny skies and beloved by the same loyal hearts. (Cheers.)

Mr. R. O. Thompson (Melbourne) said he was delighted to be present as the representative for the time being of Australia. When he reached home again, he should tell his friends there, as Mr. Coates had said, of the warm welcome he had received here together with the visitors from the Continent. It had been said that if gas men canonized anyone it would be Welsbach; and he was sure it would be a fit thing to do. He had observed, in looking over the exhibition, that the success now and in the future of their gas was somewhat of a paradox. They were, on the one hand, indebted to Welsbach for enabling them to get an increased illuminating power from their gas; and they had, on the other, their old friend Sir George Livesey working the gas down to a lower illuminating power. They each had their field. In the future, the gas industry would have to depend on the lower illuminating power of the gas on the one hand, and, on the other, on the Welsbach mantle for increasing its illuminating power. He would join Herr Körting in saying they were indebted for this great gathering to the "Helps" they had in gas engineering.

"The International Gas Exhibition."

Mr. R. Hesketh Jones, Chairman of the European Gas Company, said that, since he had entered the room, he had been asked to propose the toast of "The International Gas Exhibition." He did not know why he had been selected for this duty, unless it might be that he was apparently the oldest man in the room, and possibly the oldest there in his connection with the gas industry, because he numbered, at the end of this month, 56 years' association with gas companies. He well remembered the last exhibition—that was both electricity and gas—at the Crystal Palace in 1882. At that time he was Chairman of Messrs. William Sugg and Co., Limited, and Mr. Sugg, as they all knew, on that occasion did his utmost to show that gas could compete with electricity. He ventured to think, and to flatter himself, that his friend Mr. Sugg really did then show that gas would not be snuffed out by electricity. Coming to the exhibition of this year at Earl's Court, he found that he could almost say that gas had snuffed out electricity; for if they went to the exhibition, as he had done, and saw the enormous amount of light which was shown as being produced from gas, and compared it with that produced by electricity, one could not but say, and proudly say, that gas still held sway, and would do so. One thing he did regret in connection with the exhibition was the sparseness of Continental exhibitors; but he thought one might say that this sparseness was fully counterbalanced by the gentlemen present that night, who represented the gas industry throughout the Continent, and by their friends, colleagues, and countrymen from Canada and Australia. With the toast he had the honour to propose, he had to couple the names of Mr. H. E. Jones and Mr. Helps. Mr. Jones was the President of the Institution last year; and they all knew of the indomitable pluck and energy he had thrown into the bringing forward of this exhibition. He must, however, say that a very great deal—possibly the chief amount—of praise was due to his neighbour Mr. Helps. They all knew Mr. Helps—not only in England, but throughout the Continent. He was most indefatigable in his exertions in promoting the gas industry. He should like to say, in conclusion, that next year the Société Technique would visit Havre; and, as the Chairman of the European Gas Company, he should have the pleasure of meeting the members, and, he hoped, many of the gentlemen round the board that night.

Mr. H. E. Jones, in responding, said he felt very deeply the distinction and the difficulty of replying to this toast; and to a certain extent his embarrassment was due to the fact, as they had already discovered, that he was not the real hero of the hour. It was quite true that, by the accident of his position last year as President of the Institution of Gas Engineers, when his colleagues were determined to prosecute this scheme of an exhibition, they were so good and so indulgent to their President that, "in spite of all temptations" to seek royal dukes or chairmen of distinguished companies, they thought one of themselves—an humble engineer, practising like themselves—should be President of the exhibition. The effect of this was, very fortunately for the exhibition, that he felt personally—as Mr. Helps (the Hon. Secretary of the Institution), with his indomitable energy and *savoir faire* in all these kind of things, was giving his heart to the show—if he (Mr. Jones) interfered, he would do more harm than good. It was only right that they had associated Mr. Helps's name with the toast as well as his own; for he (Mr. Jones) had done little or nothing more in the active preparation of the exhibition than that of making room for a better man to do the best he could, as Mr. Helps had done. The gathering that night was one which filled him with pride; for they were indeed "international." It was the symbol of brotherhood—the symbol of unity in the common cause of promoting the gas industry. There was no room for jealousy. "Art is long; life is short." They none of them could do too much, shoulder to shoulder and side by side, to promote the prestige of their great industry, which was now in a position that it had never reached before. This was largely due, as Mr. Hunt had very properly said, to their having appropriated the inventions and the brilliant ideas that came to them from the Continent, which inventions and ideas represented great economy and enormous steps in gas manufacture. If one name went down in the world's history as having done for gas more than any other in these times, it would be that of Welsbach. It was he who put it into their heads, and showed them how to increase the illuminating power of their gas—not by two, three, or four fold, but by ten fold—and to get rid of some of those obligations with regard to illuminating power which were incompatible with those economies which were essential if they were to look to the other great development of their industry, which was that of fuel and power. No thinking person could look round without seeing that there was an enormous field and an enormous future open to the industry in the realm of power and fuel—fuel free from smoke, which, in these days of fog, they could appreciate; and power so economical that it was four times as great as that obtained (for equal cost) with the steam-engine. In the Commercial Gas Company's district—in the great industrial district of Millwall—there was hardly a steam-engine left. The Company had only to bring them gas at a price which made it suitable for industrial purposes for its adoption throughout. There were shipbuilders' yards there where now they even bent plates by the heat of gas for building ships; and that was not gas specially made—not the Mond gas, or any other gas of that kind—but the gas that was common to the whole of the consumers in the East of London. The name of his friend Sir George Livesey had been mentioned by Herr Körting; and he was delighted to hear it. It was a name that was dear to every gas engineer in England and on the Continent, a name of great distinction, and a name which represented a life of true, honest, and straightforward work. Sir George, like himself, had long seen that they must remove from the supply of gas trammels no longer necessary through the invention of Welsbach, and that they should place at the service of the people cheap fuel and power. In conclusion, he said he was delighted with the success of the exhibition. He had only heard that day of crowds there being so dense that they had to get the police to regulate the circulation of the people through the exhibition. This was a very gratifying state of things; and for it, after Mr. Helps and Messrs. Bridges and Smith, a great deal of credit was due to the exhibitors. At first he thought it an intrepid act to start the exhibition at all; but he was relieved and pleased to find the success it had undoubtedly achieved. He was sure that this success was, for the most part, largely due to the pains and the considerable outlay that the exhibitors had gone to throughout the whole of the exhibition. It was a splendid exhibition; and he thanked the exhibitors for having made it so.

Mr. Helps, on rising, was greeted very enthusiastically. He observed it was not very easy for anyone to get up and make a speech on any occasion, and when one had to do so after hearing all the kind things that had been said about him by such gentlemen as Mr. Jones, Herr Körting, and others, who had referred to the small services he had rendered in connection with the exhibition, it made the task doubly difficult. At the same time, it certainly did not detract from the pleasure with which he rose to respond to the toast of "The International Gas Exhibition." When the idea of the exhibition was mooted some seven or eight months ago, he was afraid it was looked upon with a certain amount of doubt in many quarters, and those quarters were certainly not of the lowest. It was first of all said: "We have had exhibitions tried in various places during the past few years; and what has been the result?—very nearly a failure, if not quite. Therefore, what chance have you, as an Institution of Gas Engineers, of making a greater success than those who have tried before you." Again, it had been said: "Supposing you do make a success, from the point of view of the exhibitors, what chance have you of getting the public there?" Now, it was not easy to prophesy before the event; but it was particularly easy to phophesy after the event, and it was just as easy to prophesy after the event was half way through. This was the case with their exhibition now. They had the pluck, as an Institution of Gas Engineers, to start it. They had got half way through, and what was the result? Mr. Jones referred to the work of Messrs. Bridges and Smith; and he (Mr. Helps) heartily endorsed his praise. Mr. Smith told him the other day he was prepared to offer a reward of £5 to anyone who could find a dissatisfied exhibitor. But engineers had come to the exhibition; and when they

had been asked to give their opinion as to whether or not the exhibition was a success, some of them had said undoubtedly it was. But, they added, after all, what was the good of it? Now, he had rather failed to find words to answer that question when it had been put to him, because he had felt that a gentleman, especially a professional gentleman, who could go to the exhibition and leave it without finding what was the good of it, and then come to him and ask him such a question—well, he did not think he could find words to answer him. However, he should say, ask the exhibitors. If the exhibitors were satisfied with the exhibition from their point of view of success, then he (Mr. Helps) did not think it was necessary to inquire further into the matter. The exhibitors had acted very loyally with the Institution, had put their shoulders to the wheel, had done just as much work in connection with it as anyone, and had put their money into it. He knew there were exhibitors who had spent at least £1000 in connection with the exhibition; and they had come to him, and probably to other members of the Committee, and said they had never regretted the expenditure for one moment. They had worked hard to make the exhibition a success; they told him it was a success, and they did not regret their share in it. He was sure that what had been done would enable gas engineers and managers to sell the commodity in which they were more particularly interested in such a way that it would bring about continued success for their shareholders, and benefit for the public at large. He could not but heartily acknowledge the co-operation of the exhibitors of all classes in connection with the exhibition. He remembered the exhibition of 1882, and he remembered, with a great amount of regret, that some of the results of that exhibition were certain jealousies. He thought those jealousies which were no doubt noticeable at the last exhibition were noticeable now by their absolute absence. He had not heard a single note of discord, or a single note which promised anything like jealousy, at this exhibition of 1904. Therefore he thought—from the point of view of those who held aloof from the exhibition on the ground that it might cause jealousy, or from the point of view that it would not be a success—their fears had proved to be entirely groundless. He must take this opportunity of thanking those gentlemen from over the seas who had visited the exhibition for the very kind remarks they had made, and for the way they had all of them spoken as to how the exhibition had been managed. They had endeavoured to show, in the words of a well-known gas engineer, that the gas industry was not yet moribund; and they had succeeded. He thought they had great cause to congratulate themselves that they had been able, in spite of the doubts that were expressed by many when the exhibition was conceived, to show that it was possible for gas engineers to do something in this way which would do more to attract the public than what they had seen during the past two or three years. He had tried to get some figures as to the number of people who had visited the exhibition; but this was of no particular use for this reason: It was decided some time ago to suggest to the Organizing Managers that tickets should be issued to gas companies (not only in London, but all over the country) for distribution, and only those tickets that were used should be paid for. This was done. A vast number of the tickets had been issued by many companies. The Gaslight and Coke Company had alone sent out something like a quarter-of-a-million tickets; and it was impossible to know how many of these tickets, or how many free tickets, had been used. It would therefore be entirely misleading if the Managers were to publish the number of admissions. People would think they were making big fortunes out of the show. They therefore thought it would suffice if he told them that night that the exhibition was generally so packed in the evening that it was somewhat difficult to get about. From the point of view of the public, there was no doubt as to the success. As to himself, what little work he had been able to do in connection with the exhibition had been entirely a work of pleasure and of love. (Applause.)

"The President."

Mr. R. Hesketh Jones proposed "The Health of the President of the Institution of Gas Engineers," at the same time thanking the Institution, on behalf of those present, for their hospitality.

The President, responding, said that, on behalf of himself and the Institution of Gas Engineers, he could only say that it had been the greatest pleasure to them to receive their guests there that night. If the conception and organization of the exhibition they had visited that day had only resulted in bringing together this magnificent international gathering, it had been well worthy of their efforts. That benefits must, and could not fail to, arise to the gas industry from the exhibition that was being held was patent to everyone of those present. Few could realize the kindly feeling, the brotherhood, the peace, and the friendship that was engendered and brought about by a gathering like this one. On the part of the Institution, he could only say that it had been a pleasure and an honour to them to receive their visitors from abroad; and he trusted they had all reaped some little benefit from their visit to the exhibition. He (Mr. Irving) should like to take this opportunity of saying that he was personally much indebted to his own Chairman and Directors for having made it possible for him to be present to take some little part in the work, and to have the pleasure and honour of presiding over this meeting.

With joined hands round the tables, hosts and guests sang "Auld Lang Syne;" and the unique assembly of French, German, Dutch, Belgian, Italian, and British gas engineers, then dispersed—each and all feeling the kindliest regard for his neighbour, whatever his nationality.

Visit to the Croydon Gas-Works.

Several of the visitors spent the next two or three days in London, and were variously entertained and interested privately. The exhibition was again visited by many; and not a few took the opportunity of making a closer acquaintance of English gas-works practice by inspection of works. Some half-a-dozen, accompanied by Mr. C. E. Brackenbury, visited Mr. Helps at the Croydon Gas-Works, and spent a very interesting time there. The works are not too extensive for ready comprehension by the stranger; and they are composed of much that is modern. In all parts, Mr. Helps found his visitors almost insatiable in the matter of requiring information, which pleased that gentleman exceedingly, seeing that it showed their interest in what they were inspecting. In explanation, Mr. Brackenbury's linguistic attainments were valuable. The West retort-house machinery was one of the first things that took the fancy of the visitors; and then the De Brouwer coke-conveyor was a feature to which they paid a great deal of attention. They were also interested in the system of conveying the coke direct from the retort-house overhead to the carburetted water-gas plant. They were, however, somewhat puzzled regarding the Botley carburation process; and it took a considerable amount of time to explain its action and purpose. However, thev isitors left very pleased with their visit, and fully of opinion that the works are happily arranged, and that in the matter of mechanically operated plant the Engineer has not gone to extremes.

THE GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 867.)

Active business on the Stock Exchange last week centred chiefly in the American Market, where there was a great deal of feverish speculation which does not particularly concern us. Elsewhere, everything was quiet and generally firm, save for a bit of realizing profits where they could be snatched. At the close of the week the tendency all round was good. A strong factor of the prevailing firm tone was to be found in the condition of the Money Market, which continues in an accommodatingly easy state. We are now within a fortnight of Christmas, and there is not a cloud on the horizon to indicate a coming change. Business in the Gas Market showed no falling off whatever from the activity which has characterized it for the last few weeks. In fact, one or two important issues were even more animated. The general advance in values was still proceeding, and was now participated in by issues which had not hitherto begun to move. In Gaslight and Coke issues, the ordinary was remarkably busy every day (Wednesday's transactions being almost a record), and prices slowly and gradually hardened. On Monday, there were two or three bargains between 97½ and 98; but these figures were soon left behind. On Wednesday, 99 was reached, and the quotation rose a point; and on Saturday, an exceptional amount was done "specially" at 99¼. Of the secured issues the maximum was most in evidence, and prices ranged from 91 to 92, with a rise of one in the quotation. The preference changed hands at 108½ and 109. Nothing was done in the debenture. South Metropolitan was only moderately dealt in; and prices were steady at from 129½ to 130½. The debenture, after being dealt in at 88½, jumped up to 90⅜; and the quotation advanced a point. Commercials were much more active upon some stock coming into the market, and both issues advanced. The 4 per cent. changed hands at from 112 to 114. The 3½ per cent. and the debenture were only done in a small amount each "free." In the Suburban and Provincial group, there were moderate dealings, coupled with some advances in quotation. Alliance old was done at 21 and 21⅛, and the new at 13 15/16 and 14; the quotation of the latter advancing. Brentford old marked 250, and new 189; while the debenture was put up 3 without any business being done. South Suburban changed hands at 122, and West Ham ranged from 99½ to 100½. Brighton original was done at 224, and the ordinary at 162½ and 163. Tottenham "B," which was standing too far in advance of "A," was drawn back 2 points. In the local Exchanges, there were rises in Liverpool and Newcastle. The Continentals were rather quiet. Imperial fetched from 205⅜ to 207; European fully paid realized 20; and Union from 106 to 109. Both Union issues advanced. Among the remoter undertakings, Bombay was done at 6⅜, and Oriental advanced without business being marked. Cape Town changed hands at 15 1/16. In Primitivas, the preference was dealt in at prices ranging from 4 13/16 to 4⅝; and the debenture at 94½, with a rise of a point in the quotation.

The closing quotations are shown in our stock and share list.

Mr. W. H. Kitson, the Chairman of the Torquay Gas Company, whose death was recorded in the "Journal" for the 30th of August, left estate valued at £80,059.

SUGGESTED INSTITUTION OF GAS-WORKS CONTRACTORS AND MANUFACTURERS.

In connection with the article on the above subject in the "JOURNAL" last week, we have had several letters, two of which are given below.

SIR,—I have perused with the greatest interest the article appearing in your current issue relating to the position occupied by contractors and manufacturers of gas plant in the industry of gas manufacture, with which they are so intimately identified. That this article and the various considerations therein so aptly dwelt upon, is appropriate to the circumstances now existing is, I think, obvious to all observers. It deserves, I am sure, the most careful consideration. This I shall certainly not fail to devote to it; and I shall be greatly interested to notice in what way the suggestions therein contained are received generally, and how it may be found possible to give practical effect thereto.

That the present position is an unsatisfactory one is very distinctly illustrated by the fact that, at a function, such as that held at the Hotel Cecil last evening, it was declared that "British Manufacturers" could not be admitted.

Believing that the visit of Continental gas men, and the proceedings connected therewith, was really identified with the Earl's Court Gas Exhibition, at which my firm are exhibiting, I was betrayed into making an application to be allowed to purchase a ticket, not imagining that the policy recently adopted by the Institution of Gas Engineers would apply in respect to an occasion of this kind.

As a fact, I had made a point of arranging to be present to meet several intimate Continental friends who were to be there, and whose visits to this country are, of course, not frequent; and it will be somewhat difficult to give them a satisfactory explanation as to my exclusion.

As to the policy which has of late years been adopted by the Institution towards traders, it is not for me to say one word, except perhaps to repeat what I said to my friend, Mr. Helps, at the exhibition, in reply to his usual courteous way of explaining these things, that I thought some traders in the gas world, at any rate, had justified their title to be considered not unworthy factors therein.

However, I make no complaint as to the policy of the Institution as such, any more now than I did, when (although I believe I am the oldest surviving extraordinary member of the late British Association of Gas Managers—having paid my subscription since 1869, and having also been a not insignificant contributor to its Benevolent Fund) I found myself excluded from the organization when recently re-constituted, without my having even the opportunity of assenting or otherwise.

I certainly think that the position now existing is one that renders your remarks and suggestions both timely and appropriate.

Millwall, E., Dec. 7, 1904. SAMUEL CUTLER.

The "JOURNAL" has once more shown how well it keeps touch with the best interests of gas engineering in its widest meaning, by the sympathetic and timely article on the above subject contained in the issue of the 6th inst. The writer of the article puts the position clearly and fairly, and no doubt gives expression to the unwritten thoughts of many a progressive engineer as to the necessity and advantages of an Association which would represent the manufacturing and experimental branches of the gas engineering profession.

Apart from the irony of circumstances which have so far saddled the makers of appliances for the employment of gas with by far the major portion of the expense of popularizing their use (although the makers' interest ends in the sale of the article, while the interest of the gas manufacturer is continuous), the fact that the whole of the producers and the greater part of the inventors and designers of the apparatus for making and using gas, at present disassociated, are brought together in this notable instance by a Gas Institution from membership of which they are excluded, is surely food for reflection. The isolation may not be felt by those who are engaged in the structural branches of the business; they are well provided for by the several excellent engineering societies.

But for the rest of us—especially those who are engaged in experimental work on appliances for the use of gas—the Technical Press and the Society of Chemical Industry are the only means of professional association. This is, of course, no disparagement of either the one or the other. We have to-day a splendid Technical Press, and the Society of Chemical Industry are doing good work; but the field of applied science is now so wide that they cannot be expected to fill the place of an Association for the pursuit of any special branch of scientific research. It is therefore much to be desired that one of the practical results of the pleasant social intercourse which this fine exhibition has made possible—even though we call it one of the bye-products thereof—will be that initial steps will now be taken to supply the deficiency on broad and practical lines.

Warrington, Dec. 10, 1904. W. H. SHERBURN.

THE BRITISH CANAL PROBLEM.

SUCH is the title of an interesting paper which was read at the Society of Arts last Wednesday week, by Mr. Arthur Lee—Sir Michael Hicks Beach being in the chair—and in which the whole question of the utilization and extension of our water-ways was again brought forward for public discussion. Mr. Lee was able to point out that, while in Great Britain canals have been neglected and allowed to fall into the hands of Railway Companies, nearly all the other great trading nations have for the last thirty years pursued a policy of development of the means for water carriage, and expended large sums of money for the purpose.

Between 1872 and 1878, France, for example, spent £9,640,000 on the improvement of her water-ways and maritime ports, and between 1879 and 1900 a further sum of £18,000,000—the total length of first-class water-ways being increased from 906 miles to 2930 miles of newly constructed canals. A further credit was passed in 1902, for over £28,000,000, to be expended in improvement of and on new water-ways. The result of the expenditure so far has been attended by a great development of the water traffic; while at the same time the railway traffic has also largely increased, though much less rapidly in proportion. A wonderful impetus is said to have been given, by the canal built to connect the Maine with the Rhine, to the mineral and other industries of Lorraine, entirely due to cheap transit facilities. In Germany, scarcely less activity has prevailed, though mainly in a later period. During the ten years 1890-99, the expenditure on water-ways in Germany was £14,950,320; and in 1900 the actual length of the water-ways within the German Empire was 8798 miles. A further expenditure of £22,000,000 is contemplated, for the purpose of providing a network of water-ways through the whole of North Germany, an improved water-way between Berlin and Stettin, besides others of more or less importance.

Other countries—notably Austro-Hungary and Belgium—are also quoted as having expended large sums in extending their water-ways; while, on the other hand, Holland, already possessing an excellent system of water-ways, found itself obliged to construct a complete network of railways. This was undertaken by the State, and leased to a Company, who provided the rolling stock and *personnel*, and worked the new lines to the best advantage. The Company pay fair dividends to the shareholders, while the canal traffic has at the same time greatly increased. Mr. Lee argues from this that the one system helps the other, in which he is probably right, since each may have its particular uses for the development of a district—the canal for heavy and bulky traffic, for which time is not of the first importance, and the railway for lighter goods requiring quick dispatch. In other words, the canal is suitable for the carriage of raw material and the railway for the finished article.

The paper recounts the efforts that have been made from time to time to induce the Government to take up this question, with the view either of nationalizing the canals, or of so amending and extending the scope of the Railway and Canal Traffic Act of 1888 as to enable trusts to be formed by the various local authorities for the purpose of developing the canals in their particular districts. A proposal to this effect was submitted to the President of the Board of Trade in 1902, by the representatives of the principal Chambers of Commerce in the United Kingdom; but nothing has since been heard of it. That this is a more hopeful way of dealing with the question than for it to become a Department of State will be generally agreed; but it is open to grave objection. The "Financial News," in commenting on the proposal, only voices the general distrust with which such a proposal is regarded by saying that it would "put one more engine of municipal trading in the hands of local authorities and, from the point of view of commercial enterprise, it takes out of the range of ordinary business what should be a profitable undertaking, and transfers it to the somewhat unattractive ownership of a non-profit-making trust." That which can be done by private enterprise in this direction ought not to be attempted by local authorities; and that this particular work has not been taken up by private enterprise is, *prima facie*, a reason why it should not be undertaken by them. Why has private enterprise not been directed into this channel? Because the development of railways in every conceivable direction has, generally speaking, kept pace with the needs of traffic. That it has done so to the complete satisfaction of the trading community cannot be said; for great is the occasional outcry against extortionate charges, preferential treatment, and the like. But if there is any grievance which cannot otherwise be redressed, or any traffic which could be advantageously catered for by water-ways, why is it that the trading community do not come forward to supply the want? Why should they call on Hercules, instead of putting their own shoulders to the wheel? Any investment which offers a fair prospect of success, or which is likely to supply a real public want, can always command support—as witness the Manchester Ship Canal. It does not need the passing of a General Act of Parliament to authorize the formation of trusts for the purpose of carrying out works of public utility. Whatever may be the condition of public business, Parliament is always ready to give full and careful consideration to schemes that appear to be for the public good.

It is such schemes that are wanted, and not merely agitation for the assistance of the State; and it is the absence of them that causes doubt as to whether there is in reality any need for further

canal accommodation. The "Financial News" appears to think there is; and recommends the Railway Companies to take the matter up, by supplementing their heavy lines with canals running alongside. There is something in the idea, which might be worked so as to relieve railways from much of the heavy traffic with which they are at present encumbered. As remarked in the "JOURNAL" when previously dealing with the subject, it could not fail of being a great boon to the colliery proprietors of the Midlands if they could get their coal to London at a rate for carriage more nearly approximating to the cost for freight from the North, than do the existing railway rates. But it must be remembered that the need for inland water-ways is, and must always be, much less in this country than on the Continent. The sea is, in fact, a canal which girts these islands, and by means of which material of all kinds is conveyed from port to port along the coast, at rates which will compare favourably with any canal dues. Apart from this, it was pointed out by Sir Michael Hicks Beach, in opening the discussion, that there are not in this country those great natural water-ways which Continental countries possess, and, being hilly in comparison with France and Germany, it is consequently less favourable to the construction of canals. All the same, there should be room for a greater use of water-ways than we now make of them; and it is to be hoped that the present agitation with regard to them may have some practical result.

MUNICIPAL TRADING AND ELECTRICITY SUPPLY.

[COMMUNICATED.]

THE Bradford Corporation claim to be the first municipal authority in this country to adopt, in connection with their electricity supply department, what is euphemistically termed the "free" supply of incandescent electric lamps and also the letting on hire of electric motors. Though the distribution of lamps to their customers and motor hiring have been in operation now for some eight or nine years, it would appear that things are not progressing quite so smoothly as they might in the woollen city. For some time past there has been a strenuous agitation by the drapers and other business men, for a reduction in the charge made for electric current for private lighting. This demand is mainly based upon an allegation that the Electricity Department of the Corporation send out lamps of inferior quality; and the unfortunate customers, naturally enough, do not wish to be hoodwinked in this fashion. The very *raison d'être* of the lamp supply department was that it would take care to distribute nothing but the best English-made lamps to the consumers, who were supposed to be totally ignorant of electric lighting matters, and incapable of looking after their own interests. That they were so is shown by the length of time they have taken to discover the "free" lamp delusion. But Bradford consumers have discovered at last that nothing is got without paying or giving something like an equivalent. It is really too bad—too unkind—to show up municipal trading in this fashion. We are constantly being told that it is the wicked contractor who is the enemy, and that if only local authorities were entrusted with the work of wiring, there would be no more bad jointing nor bad fittings, &c., and electric lighting would speedily become universal. The case of Bradford would not seem to support this theory; for, though the Electricity Department pronounce that they do not intend to depart from the principles of their schemes, they at the same time admit that certain amendments will have to be made, and that these are under consideration. At all events, it is to be hoped that they will concede the local drapers' very modest demands by giving them an increased discount instead of inferior foreign-made lamps.

Turning now to "free" wiring, what do we find? The pioneer of the "free" wiring movement—the National Electric Free Wiring Company, Limited, (now the National Electric Construction Company, Limited), have abandoned all new free wiring work; and in many places where they put in installations on the free or hire-purchase system, they are in open conflict with the local authorities who are electricity undertakers for the district. These disputes have arisen at Poplar, Rathmines, and other places, and are highly entertaining. The persons whose premises were wired on the "free" system soon discovered that, though they were not called upon to make any initial payment, the price of the current *plus* the hire of the fittings and wiring worked out at three or four times the cost of gas. There were murmurs which grew louder and longer with time; and now such of these consumers as have not removed, would only be too glad to be rid of their burden. No doubt, the Company cordially reciprocate, and wish they had in their coffers the capital expended on these "free" wiring installations. Apparently the Rathmines Urban District Council are anxious to step into the shoes of the Company, for they are promoting a Bill for (*inter alia*) powers to purchase the wiring installations, &c., of the Company in the town, and to enable the Council to undertake such work. There is, therefore, a splendid prospect for the Rathmines ratepayers. The local electricity works have not yet reached the profit-earning stage; and if they are to be saddled with these "free" wired installations in addition, there will have to be a rate-in-aid for a long time to come. At Poplar the Council have agreed to pay the Company £125, to relieve them from liability to make certain minimum payments on behalf of consumers who have ceased to take current; and attempts will be made to sell to consumers outright certain of the installations. This is the sort of business the London County Council and some of the Metropolitan Borough Councils are anxious to engage in; but then it is useless to look for great wisdom in the Council, and it would be the natural order of events if they undertook what a well-managed Company have found a failure. Anyhow, it is to be hoped that the Metropolitan Gas Companies will offer an uncompromising opposition to the Council's General Powers Bill noticed in "Electric Lighting Memoranda" last week, and also to the Bills promoted by the Woolwich Borough Council and the Ealing Corporation. The Bill of the latter body is an undisguised attempt to secure what they failed to get from Parliament two years ago. It is a wanton waste of money, and it is time some check was put on the promotion of Bills year after year, when it is apparent that the powers sought are either undesirable or would serve no useful purpose if granted.

OBITUARY.

The death occurred on the 6th inst. of Mr. W. A. HARDY, of the firm of Messrs. Bale and Hardy, of Bridge House, Queen Victoria Street, E.C.

It is announced in "Der Gastechniker" that Herr JOHANN SIMKÓ, the Manager of the Municipal gas and water works at Pressburg, died on the 17th ult., at the early age of 38. He rose from a subordinate position to the managership in 1901.

We regret to announce the death of Mr. WILLIAM ASHMORE, senior partner in the firm of Messrs. Ashmore, Benson, Pease, and Co., Limited, of Stockton-on-Tees, which took place at his residence, "The Woodlands," Yarm-on-Tees, early last Thursday morning, after a brief and painful illness. The deceased gentleman was well known in the world of gas engineering, as well as to many of our readers personally; and we are sure he will be greatly missed by a number of private friends and business connections. The funeral took place at Stockton-on-Tees on Saturday.

The death occurred last Thursday, at the comparatively early age of 54, of Mr. JOSEPH NASMITH, the Managing-Director of Meters Limited. By this sad event an energetic public career has been brought to a close. Deceased was a member of the Manchester Technical Instruction Committee, and an Examiner in "Cotton Spinning" for the City and Guilds of London Institute. He was an old member of the Manchester Association of Engineers, and served for a time as its President. He possessed considerable literary ability, and was Editor of the "Textile Recorder," and author of "Modern Cotton Spinning," "Students' Cotton Spinning." and "Modern Mill Construction." In addition to the position he held in Meters Limited, he was a Director of the Lancashire Felt Company, Denton. He was also a member of the Institution of Mechanical Engineers.

PERSONAL.

Last Thursday afternoon, the Duke of Fife presided at a luncheon given at the Hotel Great Central, Marylebone, on the occasion of the presentation of a portrait, subscribed for by residents in the borough, to Mr. EDMUND BOULNOIS, the Member of Parliament for the Eastern Division of Marylebone, and Chairman of the West Middlesex Water Company. In proposing the health of Mr. and Mrs. Boulnois, his Grace expressed the great pleasure he felt at taking part in a gathering to do honour to Mr. Boulnois. His whole career did honour to himself and to Marylebone, to whose affairs he had devoted so much of his time and talents. Mr. Boulnois had resided all his life in Marylebone, and had been associated from his early days—for more than forty years—with its public life. It must be no small reward to so useful and devoted a life for him to feel that, in the place where his work and example had been so conspicuous, men of all parties and all opinions had combined to pay him their tribute of honour and gratitude. Mr. J. S. Underhill, one of the Hon. Secretaries of the fund, next read an address, engrossed on vellum, setting out the record of the public career of Mr. Boulnois, and asking his acceptance of his portrait, painted by Mr. W. W. Ouless, R.A. Mr. G. J. Elgood, the late Mayor of Marylebone, presented the address; and the portrait, which shows Mr. Boulnois in his mayoral robes (it was exhibited at the Academy in the summer), was unveiled. Mr. Boulnois feelingly replied, and said that if he had succeeded in gaining their approval it was not through any merit of his own, but because he had been helped and supported at all times by those with whom he had worked. He could not promise to do much in the future, but what remained of his small energies was still theirs. He hoped he would be to the end a patriotic citizen of his well-beloved borough.

Mr. Josiah Chandler, of Messrs. S. Chandler and Sons, has just undergone a very serious operation at his house, "Claremont," Brixton Hill. His numerous friends will be pleased to learn that it was successful; and it may be hoped the patient will now make a steady recovery.

NAPHTHALENE REMOVAL.

By WILLIAM YOUNG.

I regret that Mr. J. Ferguson Bell should continue harping upon the age of the Young and Glover patent, the progress, or rather lack of progress, it has made, and its abandonment after trial, as evidence of its failure. In my former communication, I endeavoured, and, I hope, fairly succeeded, in explaining why in some instances the Young and Glover process had been abandoned; and in this regard I am ably supported by Mr. Wilfrid Irwin, in his interesting and instructive communication in the same issue of the "JOURNAL" as that from Mr. Bell.

The fact that Mr. Colson's process (which Mr. Bell claims as substantially identical with his own) having been abandoned at Sheffield under like conditions, and that his own process was abandoned at Leicester, all go to support the views I have expressed. Mr. Bell has not adduced a particle of evidence further than his oft-repeated assertion that the failure of the process was due to the causes referred to. Had he fulfilled his promise, and entered more fully into the application of the use of natural solvents obtained from coal tar for the removal of naphthalene deposits, and the results of his other experiments in washing with other descriptions of solvent oils at Derby, it would have been more to the purpose than his reiterated assertions. If he will only do so, I am hopeful that we shall have evidence that the loss of illuminating power resulting from the denuding of the gas of its illuminannts other than naphthalene by the high boiling point solvents should not have caused the abandonment of the Young and Glover process.

Meantime, what we have got to consider is not the success or non-success of any of the processes in the past, but whether the processes that have been recently brought under notice, and claimed as being successful—particularly the process in operation at Derby—have been anticipated by the process described in the specification of the Young and Glover patent. Mr. Bell reasserts that the Young and Glover specification "consists of a general enunciation of known facts; most extensive claims being made therein. But no definite process is described so as to be sufficient to enable anyone skilled in the business of gas manufacture to overcome by its use perplexing naphthalene stoppages." I have in my former communications tried to show Mr. Bell that he is wrong in this regard, by drawing his special attention to the description of the following process given in the specification, page 4, lines 37 to 46:—

> In the case of a gas-works, where plant exists for the distillation of the ordinary coal tars, this mode of applying our invention can be very conveniently carried into effect by collecting the early parts of the distillate of the tar, separating the naphthalene which may be present in solution by refrigeration and filtration, and using this distillate so prepared in any convenient scrubbing or washing arrangement, to wash the cooled high temperature gases and free them from naphthalene; while, at the same time, the benzol and other hydrocarbons are volatilized into the gas, adding to the illuminating power. On the coal tar distillate ceasing to be effective in scrubbing the gas, it is either run direct to the tar-well or sent back to the tar-stills to undergo distillation and filtration, and may thus be prepared for re-use.

Surely this description is definite enough and plain enough to be understood by any one who is skilled in the business of gas manufacture.

I have further drawn Mr. Bell's attention to the fact that the claims made in the Young and Glover specification are not so extensive as he desired to make them—that the claims were confined to cover no more than the processes substantially as described in the specification; and I have asked Mr. Bell to explain wherein the process just described fails in definiteness, and in what respect it was different from, or inferior to, the process he was using at Derby. As I have already stated, there is no essential difference between the process described in the specification and that in use at Derby. The process described in the specification would not denude the gas of its illuminants, nor yet the naphthalene solvents; and it would remove the naphthalene from the gas quite as effectively as the Derby process. In fact, the processes are substantially identical; and in any future communication I ask Mr. Bell to take up and deal with that point. Should he fail to do so, he must admit that the process in use at Derby has been anticipated by the Young and Glover patent.

In his further search for published anticipations of the Young and Glover process, Mr. Bell does not appear to have discovered any process where a supplementary quantity of hydrocarbon solvents has been employed to wash the naphthalene out of gas in the same manner as ammonia is washed out of the gas with water. At any rate, he refers to no such process—apparently relying on his reiterated assertions in that regard to be sufficient to invalidate that part of the Young and Glover process. Mr. Bell has, however, in his further search through the old volumes of the "JOURNAL," found something from which he gives two extracts. The first is as follows:—

> So far back as 1856, the late Lewis Thomson in the "JOURNAL" pointed out that if 10 per cent. of superior cannel be used with ordinary coal, the naphtha vapours will redissolve the naphthalene.

Your readers are asked to compare this with Young and Glover's second claim in their patent; and to enable them to do so, I think it desirable to give the second claim *in extenso*:—

> The method of carburetting and improving the illuminating power of gas resulting from the carbonization of coal at high temperatures by commingling therewith, after such gas has been cooled and freed from the major part of the naphthalene, gas produced by carbonizing *of coal, cannel*, or other hydrocarbonaceous material *at such low temperatures as will ensure the production* of gas of high quality and *of liquid hydrocarbons comparatively free from naphthalene and adapted to absorb or remove the naphthalene remaining in the high temperature gas, substantially as described.*

Surely Mr. Bell does not expect your readers to believe that there is nothing novel in the method here claimed, of separately carbonizing coal, cannel, &c., at abnormally low temperatures to obtain a supply of hydrocarbon solvents adapted to remove naphthalene from condensed coal gas, and that the late Lewis Thomson referred to such a novel method of using 10 per cent. of cannel with ordinary coal. I will leave your readers, as Mr. Bell does, to form their own opinion as to the relevancy of his reference to the extract.

The second extract from the same authority is more interesting, and has a more direct bearing upon the point at issue; and I have no doubt the first impression of your readers in looking over the extract as emphasized by Mr. Bell's italics will be that it does constitute an anticipation of the third claim of the Young and Glover patent. A short consideration of the extract and claim will, however, show that such is not the case, but that it rather furnishes the elements to demonstrate more clearly what constitutes the novelty covered by the third claim of the Young and Glover patent. In the concluding lines of the extract, Lewis Thomson says: "If during the prevalence of a middle temperature naphthalene begins to show itself, we must *surcharge the gas with naphtha vapour* so as to throw down even at that temperature a fluid compound consisting of naphtha and naphthalene."

In my former communications to the "JOURNAL," and more particularly in my last (on page 465, about the middle of the second column), the physical facts enunciated by Lewis Thomson, given in the above extract, are dealt with; and it is there stated to have been common knowledge at the date of the Young and Glover patent that the surcharging of gas with the vapours of such volatile and high tensioned hydrocarbons as naphtha would have the effect stated by Lewis Thomson. But it was explained that the quantity of such vapours that would require to be present in the gas before their tension was lowered to be equal to the quantity of naphthalene in the gas, would be so great that the gas would necessarily smoke. The mere enunciation by Lewis Thomson of the fact given in the extract is no evidence that this physical fact had been practically applied. Had it been, it would have been found, for the reasons to which I have referred, practically unworkable; and there is no evidence of such a process having ever been used except for the clearing out of local obstructions of naphthalene. Even allowing, however, that it did constitute an anticipation of the third claim of the Young and Glover patent, it might make it necessary to disclaim that part of their patent; but after this was done, Mr. Bell would be in no better a position than he is now.

In a letter which appears in your issue of Oct. 11, Mr. Bell says: "Mr. Colson washes a portion of the gas with a solvent obtained from coal tar, consisting mainly *of oils* having boiling points between 170° and 215° C.; whereas I wash the gas at the same point with a solvent obtained from coal tar, which consists *of oils* having boiling points mainly between 150° and 205° C." The process in use at Derby is thus shown, on Mr. Bell's own statement, to be primarily a process for washing the naphthalene out of the gas, before it leaves the works, with *solvent oils* obtained from the early portion of the distillates of coal tar, and only in a minor degree for the carburetting of the gas, and that not by surcharging the gas with naphtha vapours, as suggested by Lewis Thomson, which would cause the gas to smoke, but with the vapours of naphthalene solvents from the washing oils having so much lower tensions than naphtha that they can be added to the gas in such quantities that they will, under like temperature conditions, condense out of the gas, along with the naphthalene that may escape the washing process, and take it up in solution, preventing it being deposited in the crystalline state; while they will not cause the gas to smoke. The Derby process is therefore founded upon the same principles, and employs the same methods and materials of applying those principles, as those described and claimed in the Young and Glover patent specification.

In the further search, Mr. Bell may be more successful than hitherto in discovering published anticipations of the Young and Glover process. I feel fairly confident, however, that the further he searches, and the more he considers the specification of the Young and Glover patent, the more will he be driven to the conclusion that Young and Glover have been before him—that after having studied the fundamental principles underlying the naphthalene problem, and having satisfied themselves of the essential conditions necessary to success, Young and Glover have taken care, in the drafting of their specification, to clearly describe and claim every possible novel and original method by which these fundamental principles can be successfully carried into effect, and have as carefully avoided claiming, or have disclaimed, what was old and known to be non-essential. I may, however, be wrong in this regard, and should such be the case, Mr. Bell will find that Young and Glover will be ready to accept of the position, and not continue, as Mr. Bell does, to refuse to admit facts which are plainly placed before them.

THE TESTING OF INCANDESCENT BURNERS AND MANTLES.

By Victor A. Reitich.

I am much gratified at the amount of interest shown in, and the space you are allotting to, the subject of mantle and burner testing, and regret that the time taken up by the mails will bring this communication on the subject a little late. The facts of having brought such giants in our profession as Messrs. Abady and Leicester Greville to enter the arena and ventilate their ideas, and of causing Mr. Holgate to explain away his inconsistent readings, have been, to me, a most satisfactory outcome to the suggestions published in your issue of Nov. 1. Some months back (in January or February), I approached one of the chiefs of the Washington Bureau of Standards on the subject of testing a special burner; but at that time they were not equipped for a mantle test in any shape. I pointed out the enormous field of this method of lighting, and respectfully suggested that the necessary appliances should be installed. Not having heard further, I wrote again on Nov. 17 to the aforesaid gentleman, and had a reply in which it is said that "I believe that the Bureau of Standards at Washington is now open for work, the address is: National Bureau of Standards, Washington, D.C."

Of course, these tests will be along the lines indicated by Mr. Leicester Greville—that is to say, they will certify that on a certain day (barometrical and thermometrical conditions observed), at various pressures, with a specified quality of gas of known B.T.U.'s, the burner and mantle supplied will be stated to give such and such results. During the past few months, the writer has had "official" tests made by impartial authorities, such as Columbia University, New York, Institute of Technology, Boston, Trinity College, Hartford, Harvard University, Cambridge, &c., and has received reports similar to that outlined above, giving a description of the burner and the mantle, together with the type of photometer used, the disc box described—incidentally, the Lummer-Brodhum seems to be a favoured one here—and the standard specified (16-candle electric lamp at a given voltage with an efficiency of $\pm \frac{1}{4}$ candle power in most cases). At the same time as the various tests were conducted with the burner in question, for the sake of comparison, one of another make—the American Welsbach—was also tried, with the same mantle and chimney. The results are not given here, as they would, to repeat Mr. Abady's words, savour of advertisement.

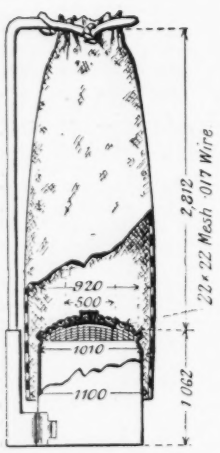


Fig. 1.

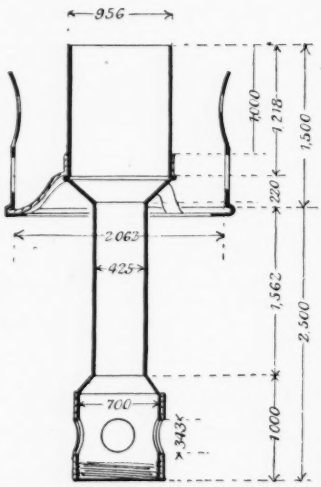


Fig. 2.

For the information of those who are unacquainted with the American methods, it may be here stated that the mantles used on all the aforesaid tests are mounted on a cap similar to the way mantles were sold when the writer joined the English Welsbach Company in 1890. This cap was patented at the time by the late Manager of the Company, Mr. Heald; but the Americans have modified it, as shown in fig. 1. Mounted in this manner, they are easily transferred from one burner to another; and as the large majority of lamps sold here are designed to carry this method of mounting, and are provided with adjustable gas-checks (and in many cases provisions for air regulation beside), a certain proportional similarity of results may be obtained in different localities with entirely different qualities of gas. With this knowledge, I am still tempted to think that a standard burner and mantle may yet be established, and send a sketch as a suggestion to that end, and give measurements in thousandths of an inch. I believe I am correct in saying that, with the mantle which has been referred to—namely, the No. 197—it is customary to destroy those that exceed certain dimensions.

I shall take pleasure in sending you, Mr. Editor, some of these mantles for your inspection, and ask you to be good enough to hand some to such gentlemen as you think are sufficiently interested. My own experience leads me to conclude that the consistency in results of tests is convincing.

While it has yet to be settled as to the definite influence the candle power of gas has upon the efficiency of the mantle burner, I have found, roughly speaking, that the light value of the 5-foot argand will approximately represent the candle-foot-hour of the mantle burner as fig. 2—that is to say that, when using a good mantle on such a burner, at its best duty, five times the amount of light should be obtained per foot of gas compared with the statutory candle power. Whether the dozen or so tests that have been made in different towns have given this result by chance, or if it would eventually be a fact, remains to be proved. The following analysis of the various candle power of gases of 816 towns in the United States, as given in "Brown's Directory," may be interesting:—

16-candle	power	gas	7	per cent.
17	,,	,,	7	,,
18	,,	,,	28½	,,
19	,,	,,	4½	,,
20	,,	,,	16	,,
21	,,	,,	3½	,,
22	,,	,,	17	,,
23	,,	,,	3½	,,
24	,,	,,	5	,,
25 up	,,	,,	8	,,

The writer hopes to visit a large number of these towns, or have reliable tests conducted, and at a later period will communicate the results. In this manner a factor may be determined when a standardizing bureau has been established.

The Buhlmann process of mantle making should, from the description, give a great similarity in the mantles made; and it would be well to have some of your readers' impartial opinions as to how far these mantles are alike, in shape, diameter, candle power, and life as regards maintenance of candle power.

In my next communication, I hope to answer Mr. Abady's article seriatim; but for the present I venture the statement that if everyone shared his views, it would be useless for any company, in advertising their burners, to state what the efficiency of them had been found to be. If manufacturers in the past have made claims of efficiency for any particular burner, which may have appeared excessive to Mr. Abady in the same manner as they have impressed the writer, has this error not been due to lack of proper facilities and a standard to be followed rather than to any intentional purpose to deceive? My argument is that, if a Standard Bureau were established, an efficiency given by it would be much nearer the actual result than a test made here or there under varying conditions and varying standards.

Again, referring to my own tests during the past week, a German mantle of ¾-inch diameter and 3½ inches long was placed on a suitable burner, and after ten minutes' burning gave a light of 104 candles with 2·8 feet of 23-candle power gas—an efficiency of 37·2 candles. But in three hours the candle power was reduced to 53. Would one be justified in claiming 37 candles to the foot? I say, No. To reduce this to an absurdity, if I took a 1-foot burner and put magnesium ribbon into it, I might get 200-candle power so long as the ribbon lasted. The same burner with a staple commercial mantle will give an efficiency of 23, and maintain this for a long period. That is what I would call the true efficiency of the burner and mantle.

To again refer to the Buhlmann process, the laboratory is reported "to be replete with appliances for testing . . . the various chemicals." This being so, I contend that not only two but 2000 mantles can be made alike. The less one depends upon human skill, the greater the uniformity in manufacture should be. Over here, mantle-heads are all gathered and sewn by machine; so that any agreed opening at the head may be accurately perpetuated.

Mr. Leicester Greville does not seem to fear the result of getting a reliable individual test, but thinks the universal system impossible. I suggest that a universal test may be reached in this way. Take a burner of proportions as fig. 2, on which put one of the lot of mantles agreed upon to be the standard. After burning it ten minutes, take ten readings, repeat the same for (say) three or four days, then average the thirty or forty readings and, for argument's sake, assume 20 candles to be such figure. Another mantle is sent to be tested; after burning for ten minutes, take ten readings and leave burning continuously, and take 24, 48, and 72 hour readings. If the third day shows no appreciable falling off, again test your standard mantle about the same time as the one under examination, so that the same make of gas will be used and the atmospheric conditions will be equal. For some reason we will assume our standard only gives 19 on the day in question, and the other one gives but 17. It then becomes a simple equation, that with 19 being 20, 17 becomes 17·9, which I would then judge to be the duty of the mantle. When testing the burner, a precisely similar method can be carried out, with this difference—that the result may be reached at once. So that on any particular day we will assume our 20-candle mantle to be giving 20½, and when placed on the burner to be tested, gives 24. By the same rule, I would describe the burner as giving an efficiency of 23·4.

No gas check is shown in fig. 2, as an adjustable one of preferred design can be agreed upon—one, I would suggest, in which the potential energy of the gas is least impaired.

WORKING RESULTS FROM DELLWIK WATER-GAS PLANTS.

THE proposal made by Professor Vivian B. Lewes, in the paper he read before the Gas Section of the International Engineering Congress at Glasgow in 1901, of utilizing, in a novel manner, blue water gas produced by the Dellwik process in conjunction with coal-gas manufacture, was so contrary to approved practice at the time that it necessarily could not at once be accepted. To give confidence, it was essential that reliable working results, covering a considerable period, should be obtained. While we have, from time to time, been able to reproduce information from foreign journals as to the progress made with the Dellwik process, there has, as yet, been very little to record from the English installations of plants. We are, however, now enabled to put before our readers working results from some of the installations extending over a time sufficient to put the reliability of the figures beyond question.

It is now nearly two years since a Dellwik water-gas plant was set to work at the Cleethorpes Gas-Works; and the Engineer (Mr. E. J. Brockway) has kindly placed at our disposal the results of his working during the past eighteen months. In that period, various experiments have been made to ascertain the best method of mixing the blue water gas with the coal gas, to ensure easy working and uniform and trustworthy results. Consequently, it is during the latter portion of the period mentioned that the best results were obtained; but Mr. Brockway must be congratulated on the showing he is able to make for the entire period.

During the eighteen months ending on Oct. 1, the quantity of blue water gas made at Cleethorpes was 28,200,000 cubic feet, which works out at an average of about 22 per cent. of the total make of gas. As the water-gas plant is capable of producing in that time about 120 million cubic feet, the intermittent working has naturally and materially tended to increase the cost of the water gas. Nevertheless, the average cost of the blue gas in the holder, including the items enumerated below, works out at 3½d. per 1000 cubic feet, made up as follows:—

Coke for generator (including stand-by coke used)	2·15d.
Labour	0·70
Boiler fuel(breeze)	0·40
Purification (same as for coal gas)	0·25
	3·50d.

In this cost, the coke has been taken at 10s. per ton; and all the coke used for keeping up the fire in the generator when not in use is charged to the plant.

We give below a tabulated statement, taken from Mr. Brockway's books, showing the water gas results every three months since the adoption of the plant.

Working Results with the Water-Gas Plant at Cleethorpes.

	April-June, 1903.	July-Sept., 1903.	Oct.-Dec., 1903.	Jan.-March, 1904.	April-June, 1904.	July-Sept., 1904.
Total amount of gas made, cubic feet	15,967,000	23,028,400	30,476,300	28,738,400	19,649,900	27,577,400
Total amount of coal gas, cubic feet	11,444,000	20,124,700	25,137,300	24,468,300	17,211,900	21,700,700
Per cent. of coal gas in mixture	71·7	87·4	82·5	85·9	88·6	78·7
Total blue water gas, cubic feet	4,523,000	2,903,700	5,339,000	4,270,100	2,438,000	5,876,700
Per cent. of blue water gas in mixture	28·3	12·6	17·5	14·1	12·4	21·3
Total benzol used, gallons	—	1018	858	495	70	39
Benzol per 1000 cubic feet of water gas, gallons	—	0·38	0·16	0·115	0·028	0·0066
Yield of coal gas per ton, cubic feet	10,600	10,927	10,927	11,088	11,088	11,096
Yield of water gas per ton of coke, including coke used while standing off, cubic feet	52,100	51,900	51,700	56,300	53,400	63,400
Illuminating power in candles	16·6	16·4	16·3	16·7	16·3	15·9

Examining carefully these tabulated results, the value of the experience gained with the plant at Cleethorpes is very striking. Take, for example, the three months ending September, 1903—this being the first period in which the quantity of benzol used was noted—it is found that, with a 12·6 per cent. mixture of water gas, the total quantity of benzol used was 1018 gallons, equal to 0·38 gallon per 1000 cubic feet of water gas added; the illuminating power of the mixed gas being 16·4 candles, and the calorific value 626 British thermal units gross. After twelve months' experience in water gas auto-carburetting, we find that the benzol used has been reduced nearly to vanishing point; so that, for the three months ending September last, with a mixture of 21·3 per cent. of blue water gas, the total quantity of benzol used is only 39 gallons, or 0·0066 gallon per 1000 cubic feet of water gas added—the illuminating power being 15·9 candles, the calorific value 595 British thermal units gross. It should especially be noticed that, although Mr. Brockway is now obtaining practically the whole of his enrichment for the water gas from his coal-gas product, it has not been at the expense of his yield of coal-gas, as he has also increased the yield of coal gas to the extent of about 400 cubic feet per ton. It is only fair to state, however, that since the adoption of the plant Mr. Brockway obtains a thicker tar, which he sells at a slightly reduced price to that previously obtained.

When we examine the last three months' working, very clear evidence is found that considerable economy can be effected in gas production by an efficient process of auto-carburetting, seeing that, in this case, 5,876,000 cubic feet of non-luminous blue water gas has obtained sufficient illuminating value to bring it to 15·9-candle power, without reducing the value of the coal gas to any appreciable extent—certainly not more than half-a-candle; and there has been used only the insignificant quantity of 39 gallons of benzol.

The illuminating power of the mixed gas is being tested daily in the works by one of Wright's 1-candle power water-gas photometers, and is further checked on the district supply main with the ordinary standard photometer. The calorific power of the gas is also carefully tested at intervals; the average of a great number of tests working out to 626 British thermal units per cubic foot gross and 563·2 British thermal units net. Since the water-gas plant was adopted, the consumers have benefited to the extent of 5d. per 1000 cubic feet—the price of the gas having been lowered by this amount; and Mr. Brockway has no doubt that the credit for the greater portion of this reduction is due to the water-gas plant, seeing that, for the first twelve months, a yield of 13,900 cubic feet of the mixed gas was obtained per ton of coal carbonized.

Mr. Brockway has also made some interesting experiments as to the reliability or otherwise of benzol enrichment, having made a series of tests between the works and the end of his district—about 1½ miles. The photometers employed for the test were first of all checked one against the other, to ensure both registering equal illuminating power for the same gas. The result of fourteen days' experiments showed that within half-an-hour of the benzol carburetter being put into action at the works, an increase in candle power was recorded at the end of the district, while the difference in candle power between the works and the end of the district did not reach at any time half-a-candle.

It is pleasing to find that the results obtained at Cleethorpes are fully confirmed by those from the Rushden and Higham

Rushden and Higham Ferrers Working Results, from February to September, 1904, Using the Dellwik Water-Gas Plant.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.
Coal gas made, cubic feet	7,850,800	7,300,500	6,536,500	5,246,900	4,983,600	5,292,600	5,411,300	5,580,600	6,381,400	6,947,500
Blue water gas made, cubic feet	2,355,800	1,863,900	2,106,900	1,702,100	1,404,600	1,641,400	1,630,500	1,343,700	1,955,500	2,116,600
Yield of coal gas per ton, cb. ft.	11,034	11,295	11,597	11,543	11,525	11,895	12,150	12,096	11,959	11,665
Yield of blue water gas per ton of coke, cubic feet	72,200	66,152	68,512	70,065	75,045	66,696	67,346	68,079	71,325	71,287
Yield of blue water gas per ton of coke, including stand-by charges, cubic feet	55,824	55,420	57,330	57,763	58,567	54,090	55,820	55,874	59,113	59,730
Per cent. of coal gas in mixture	77·1	79·7	75·6	75·1	78·0	76·4	76·9	80·6	76·5	76·2
Per cent. of blue water gas in mixture	22·9	20·3	24·4	24·9	22·0	23·6	23·1	19·4	23·5	23·8
Total benzol used, gallons	890	806	728	442	270	444	438	375	469	431
Benzol used per 1000 cubic feet of blue water gas	0·378	0·432	0·345	0·256	0·192	0·271	0·268	0·279	0·239	0·203
Illuminating power, candles	14·99	16·17	16·05	16·00	16·09	16·21	16·12	16·12	15·98	16·05

Coal used during ten months	5289·17 tons.
Coke used for the manufacture of the blue water gas	263·17 ,,
Coke used, including the coke consumed while standing off	316·18 ,,

January to June Inclusive.

	Coal Gas. Cubic Feet.	Mixed Gas. Cubic Feet.
Gas sold	10,304	13,371 per ton of coal carbonized.
Gas accounted for	10,533	13,668 ,, ,,

Nov. 14, 1904.

(Signed) T. WATSON, Manager.

Ferrers Gas Company, where a Dellwik plant has been in successful operation for the last ten months. In this case, the coal is carbonized in single-ended retorts instead of in throughs as at Cleethorpes, while both works have ordinary hydraulic mains. Mr. Watson, the Manager of the works, has favoured us with extracts from his carbonizing books, showing the results as obtained for each month's working; and these are given in the table at the bottom of p. 839.

Here, again, looking at the tabulated results, we find that the results of experience has quickly reduced the amount of enrichment necessary. During the first two months' working, two or three methods of mixing the blue water gas with the coal gas were tried, with varying results, in consequence of which the results are not a fair criterion of what it is possible to obtain with the plant. But the one giving the best and most reliable working was very quickly determined; and Mr. Watson began to obtain the returns that he has since maintained.

Previous to the adoption of the water-gas plant, the average yield of coal gas per ton of coal was 11,100 cubic feet; but it was soon noticed that an increased yield per ton of coal was being obtained—the average increase being about 500 to 600 cubic feet per ton. As might be expected with such a high yield, it has been found impossible to entirely dispense with the benzol enrichment; but even here the quantity required is small, averaging, as it does, only 0·292 gallon per 1000 cubic feet of blue water gas—the average candle power of the mixed gas during the ten months being 16, and the average gross calorific power 576 British thermal units per cubic foot.

Mr. Watson also informs us that, during the first six months' working, he accounted for 13,668 cubic feet of mixed gas per ton of coal carbonized, and sold 13,371 cubic feet per ton, which results are certainly very creditable. His experience so far leads him to confidently expect that his later figures will be increased for the next six months. The coals used by Mr. Watson are by no means special in quality. Similar coals are used at a number of works; the coals being three of Rother Vale to one each of Barrow, Grimethorpes, Small Gas, and Old Silkstones.

During the last three months, a Dellwik plant has also been working at the Barking Gas-Works; and, thanks to the previous experience gained, it has quickly produced good results. Mr. Reidie is now mixing from 15 to 20 per cent. of blue water gas with his coal gas without any benzol enrichment, and is maintaining practically the same illuminating power as was originally obtained from his coal gas. There is little doubt that these results will be fully maintained, even if not improved upon.

From the earlier Dellwik installations, similarly satisfactory information comes to hand, as, for instance, at Ilford about 16 to 20 per cent. of blue water gas is used regularly; the mixed gas requiring only a small addition of benzol to keep the quality up to the required standard.

PRESSURE RAISING PLANT AT THE DOVER GAS-WORKS.

By the courtesy of Mr. Raphael Herring, the Engineer of the Dover Gas Company, we are able to give some illustrations of a plant which has recently been installed at his works for increasing the gas pressure in the trunk mains leading from the works.

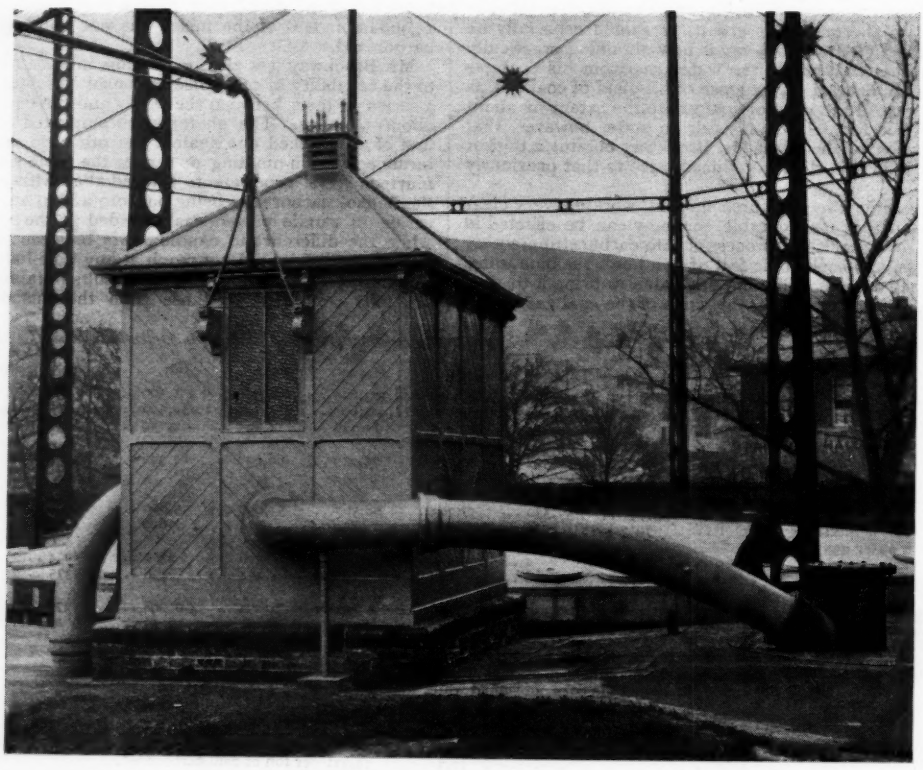
At Dover, besides the storage gasholders at the works, there are in the town, at about a mile-and-a-half distant therefrom, two holders, from which the gas is delivered into the town. It was found during last winter that there was much difficulty in filling these holders through the trunk main; and it could only be accomplished during the time of maximum gasholder pressure at the works, and this was not always possible. The problem that presented itself was whether the large expenditure involved in the laying of a new trunk main should be incurred, or whether the result could be obtained by intensifying the pressure by means of machinery.

It was under these circumstances that Mr. Herring consulted with the Sturtevant Engineering Company, and ultimately arranged with them for the supply of one of their steam-driven gas-exhausters. This, according to the statements made by the Company was the first gas-exhauster so coupled to a steam-turbine; but the example established at Dover has since been followed at Plymouth and Leicester.

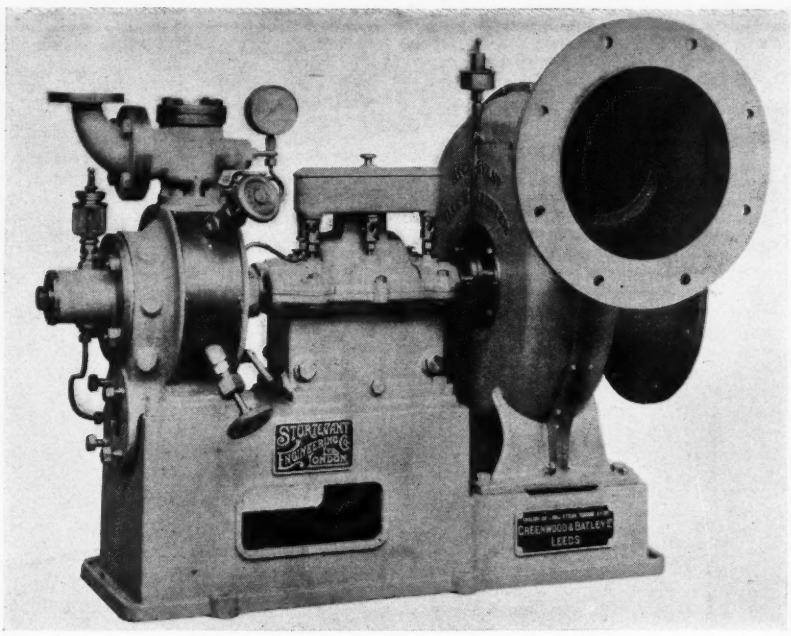
Having made this arrangement with the Sturtevant Company, the Dover Gas Company entered into a contract with Messrs. Samuel Cutler and Sons, of Millwall, for the installation of the entire apparatus; and the latter firm supplied and erected the two buildings containing the machinery and the steam-boiler, the steam-boiler itself, and all the various additions and alterations required to the gas connections, as shown by the several illustrations.

The result has been eminently satisfactory in every respect—completely fulfilling all the expectations formed. The turbine runs at a speed of about 32,000 revolutions per minute—resulting in an exhauster speed of some 4000 revolutions per minute; the consumption of steam being extremely small.

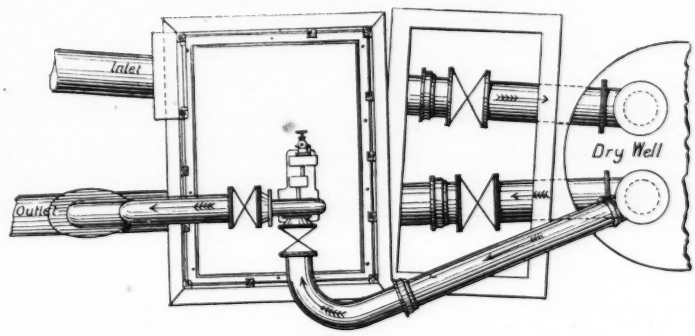
During a test, it was found possible to maintain a pressure in the trunk main of 240-10ths; but, in practice, this pressure was not required—from 100-10ths to 130-10ths being quite sufficient, and this only during the period of maximum consumption.



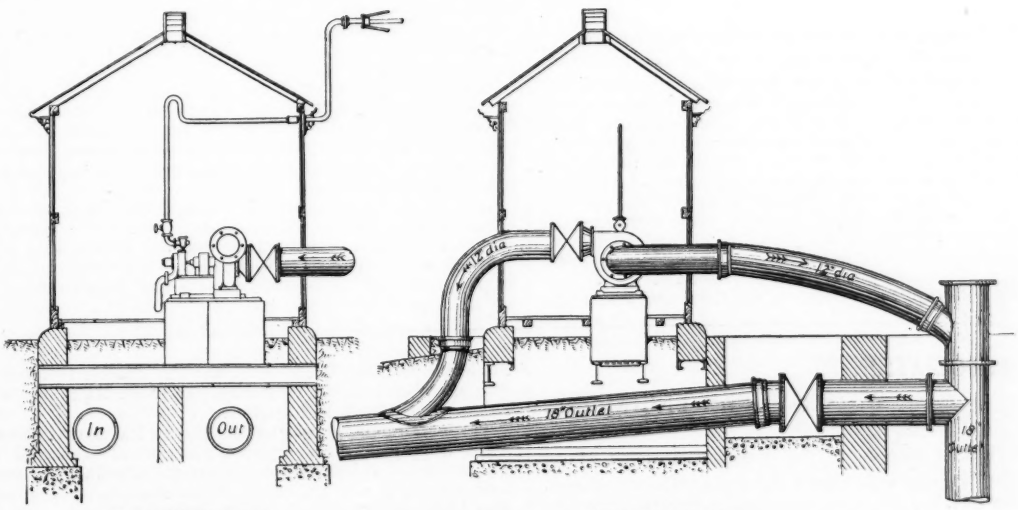
The Turbo-Exhauster House at the Dover Gas-Worrs.



THE STURTEVANT INTENSIFYING PLANT.



PLAN.



END ELEVATION. SIDE ELEVATION.

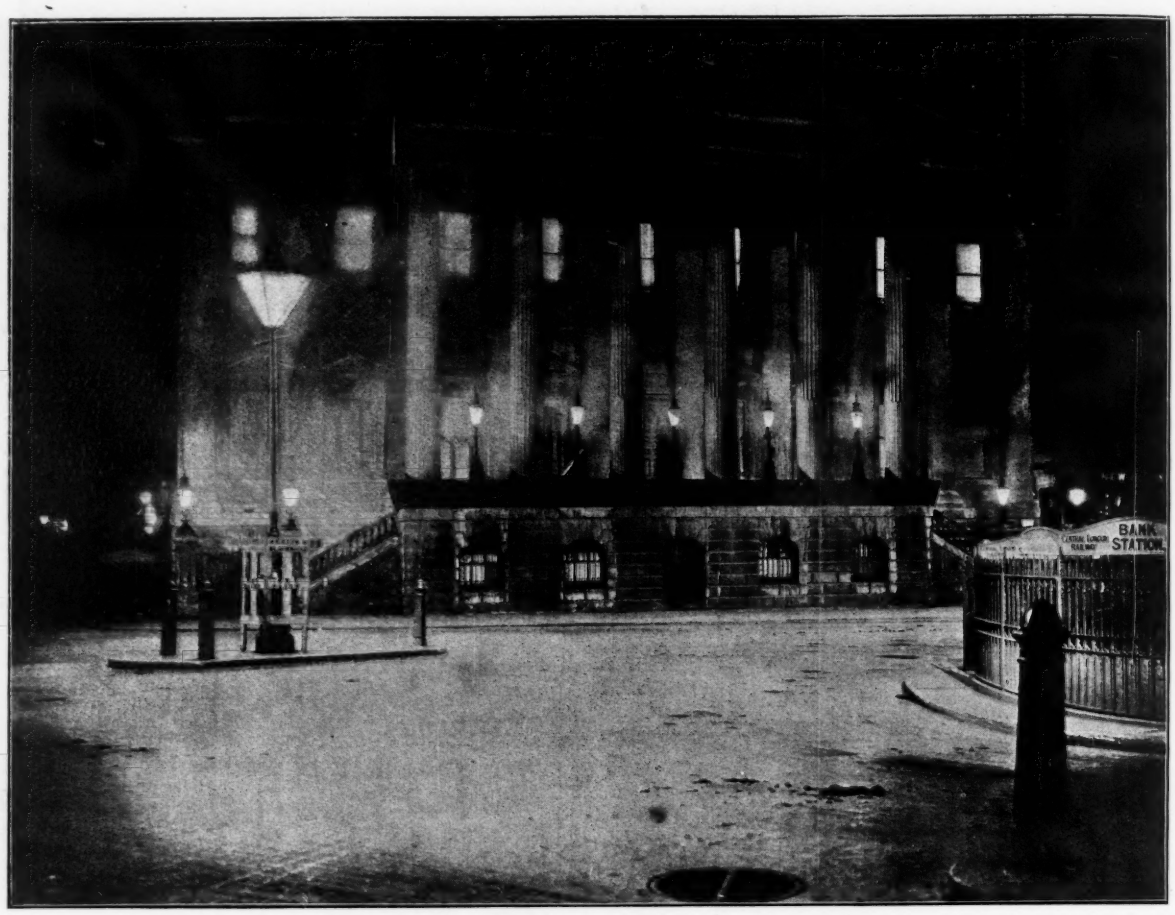
The following table gives some of the working figures that have been obtained :—

Date.	Working Hours.	Gas Pressure.	Quantity of Gas Compressed.	Steam Pressure.	Fuel per 1000 Cubic Feet of Gas Compressed.*
		Tenths.	Cubic Ft.		
Nov. 29 .	3 p.m. to 9 p.m.	100 to 130	483,000	110 lbs.	11½ oz.
,, 30 .	3 p.m. to 7 p.m.	,, ,,	287,000		
Dec. 1 .	3 p.m. to 9 p.m.	,, ,,	470,000		
,, 2 .	3 p.m. to 9 p.m.	,, ,,	486,000		

* This includes lighting the boiler fire four times.

Mr. Herring concludes his communication by saying that the originals of these illustrations are exhibited at Messrs. Cutler's stall at the Earl's Court Gas Exhibition, and that the plant at Dover is quite open for inspection (by appointment) to those interested therein.

We are asked to mention that the son-in-law referred to in the course of the Ellis-Lever Bankruptcy proceedings noticed last week (p. 784), to whom the Manchester coal business was sold for £12,000, was Mr. Bostock, of Liverpool, not Mr. Worthington Church, of the Midland Coal Company, of Nottingham and London.



Photograph by] [*Borup Bros.*

IN FRONT OF THE MANSION HOUSE.

A NOTABLE ILLUSTRATION OF HIGH-PRESSURE GAS LIGHTING.

EVERYBODY who knows London will recognize the photographic pictures on this and the opposite page—two well-known public buildings, and the centre of the great commercial and municipal life of the Metropolis. The photographs, however, are particularly interesting from the point of view of our readers, as they illustrate the lighting by high-pressure gas—not electricity—of this important space, about which the traffic, taking the day through, is more considerable than certainly in any other centre. The first view shows the lighting in front of the Mansion House, and the second that in front of the Royal Exchange; the high-pressure system adopted being that of the James Keith and Blackman Company, Limited. The excellence of the lighting has been the subject of much comment by those who have seen it.

The lamps are all supplied by one of the Keith and Blackman Company's latest No. 3 water-driven gas-compressors, of the enclosed pattern, placed below in the convenience, the entrance to which is surmounted by the two lamps shown in the Royal Exchange photograph. The piping to these various lamps has been very conveniently run in the Central London Railway Subway; connections being taken upwards to the lamps where required.

Immediately in front of the Royal Exchange is a 2000-candle power lamp; this illumination being obtained by a cluster of six burners fitted on the Company's special patent column anti-vibrator. The two lamps over the steps leading down into the convenience are each of 600-candle power, and are also fitted with column anti-vibrators.

In front of the Mansion House, however, the lamp is of 3000-candle power; and, as will be remarked from the photograph, the diffusion of light on the roadway and the surrounding pavement is remarkable. The light in this lamp is obtained by only three burners, each of 1000-candle power, and likewise fitted on the special type of anti-vibrator.

BRITISH ASSOCIATION OF WATER-WORKS ENGINEERS.

The Ninth Winter Meeting of the Association was held on Saturday at the Geological Society's Rooms, Burlington House. The PRESIDENT (Mr. F. J. Bancroft, B.Sc.Lond., Assoc.M.Inst.C.E., of Hull) was in the chair; and there were about forty members present.

CONFIRMATION OF MINUTES.

The SECRETARY (Mr. Percy Griffith) first read the minutes of the meeting held at Hull last June, and gave a sketch of the subsequent tour on the Continent, as reported in the "JOURNAL" at the time. The record was confirmed.

PAPERS AND DISCUSSIONS.

The first paper was by Mr. GEORGE MITCHELL on "The Appleton Extensions of the Warrington Corporation Water-Works." In the absence of the author, the paper was read by the Secretary. Contributions were made to the discussion by Dr. Kemna, Mr. Frederick Griffith, Mr. R. Askwith, Mr. Easton Devonshire, Mr. William Watts, Mr. C. H. Priestley, Mr. W. Matthews, Mr. P. H Palmer, and Mr. S. R. Lowcock.

The second paper was by Mr. FRANK LATHAM (Penzance), on "The Supply of Surface and Underground Water to Towns." The author was absent through an attack of influenza; and therefore his paper was also read by the Secretary. The members who took part in the discussion were Dr. Kemna, Mr. William Whitaker, Mr. C. E. Jones, Mr. H. E. Stilgoe, Mr. T. N. Ritson, Mr. Askwith, and Mr. Easton Devonshire.

The third paper was by Mr. J. HUTTON (Scarborough); and was on "Electrically-Driven Pumping Plant for Water Supply and Storage of Water under Pressure." Instead of reading it, the author pointed out its salient features. The discussion was opened by Mr. R. S. Lloyd, and was continued by Mr. T. R. Smith, Mr. C. Sainty, Mr. C. E. Jones, and Mr. Hutton.

Abstracts of the papers, with notes from the discussions, will appear in succeeding issues of the "JOURNAL."

OFFICE-BEARERS AND NEW MEMBERS.

The PRESIDENT read the report of the Scrutineers of the balloting-papers (Messrs. Arthur Andrew, of Oldham, and Herbert

Photograph by] [*Borup Bros.*

IN FRONT OF THE ROYAL EXCHANGE.

Swinney, of Chepstow). It showed that the following gentlemen had been elected to office:—

President.—Mr. P. H. Palmer, of Hastings.

Vice-Presidents.—Mr. William Millhouse, of Scarborough; and Mr. C. Sainty, of Windsor.

Council.—Messrs. G. Greenslade, William Matthews, H. Ashton Hill, W. H. Humphreys, C. E. Jones, H. E. Stilgoe, J. S. Pickering, T. Bower, J. J. Lackland, and C. C. Smith.

Hon. Secretary and Treasurer.—Mr. W. G. Pierce, of Richmond.

The following new members and associates were also elected:—

Members.—Mr. J. Clarkson, of Irvine, N.B.; Mr. J. E. Johnston, of Bedlington, Northumberland; Mr. G. R. Strachan, of Westminster; Mr. Arthur Valon, of London.

Associates.—Mr. P. H. Bettle, of Aldershot; Mr. F. Candy, of London; Mr. C. J. Conquest, of Alton, Hants; Mr. R. S. Raffety, of Gosport; Mr. J. L. Redfern, of Carlisle; Mr. W. L. T'Anson, of Sunderland; Mr. R. A. Rogers, of Newton-Abbot; Mr. W. T. S. Schlund, of Plumstead Common; Mr. W. J. Wilding, of Runcorn; Mr. A. Williamson, of Bamford.

Mr. PALMER asked to be allowed to thank the members very heartily for having elected him as President for the ensuing year. He knew that he had many good men to follow; but it would be his endeavour to do all he could to help to increase the usefulness of the Association. He could promise the members that, in the summer, if the Association visited Hastings, they would have a good welcome. There would be plenty there to interest them—a great deal of new work, and a great deal of old. He hoped that as many members as possible would turn up if the meeting was held there. The Corporation would offer them a very hearty welcome; and personally he should be only too glad to do what he could for the comfort and amusement of the members.

PRESENTATION TO DR. KEMNA.

The PRESIDENT said the members all knew that this year they made a new departure in their proceedings. The Association paid their first visit to the Continent—going to Belgium. This, of course, entailed a large amount of preliminary work, even before they could say the visit was possible. Now the whole of that work, he thought he might say with perfect accuracy, was undertaken by Dr. Kemna; and those members who were of the party knew with what smoothness everything worked while they were on the visit. From the time they set foot in Belgium, they had evidence of the thoughtfulness and organization of Dr. Kemna. His urbanity, his stock of technical knowledge, and the heartiness with which his brother managers came to his assistance—all these things combined to make the visit an unqualified success. He (the President) occasionally felt during the visit that it was a week of toil to Dr Kemna; but he was sure that it was also a pleasure. But, although he had a pleasant smile and a good word for everyone, he (the President) thought that sometimes their friend felt no little responsibility in having 68 members over from England. Not until the visit was finished could they write down the words "a perfect success;" and that they were then able to do. It had spontaneously occurred to them that Dr. Kemna should not only have these days of anxiety on his mind when he thought of their visit, but that he should have there as well the recollection of some little recognition of their appreciation of his services. He (the President) had therefore been asked, on behalf of the members and friends who accompanied them, to present to Dr. Kemna a silver tea and coffee service. In conclusion, he said: I have great pleasure, Dr. Kemna, personally and on their behalf, in asking you to accept this gift. I trust you will always have the joy and pleasure in your mind that comes from serving others, that you may have good health and happiness, and that you and Mrs. Kemna, who graced our functions with her presence, may have long days to enjoy this tea and coffee service, of which I now ask your acceptance.

It was a choice gift; and on one of the pieces was inscribed: "Presented to Adolphe Kemna, Doctor of Science, of Antwerp, by the members of the British Association of Water-Works Engineers who visited Belgium in June, 1904, as a mark of their appreciation of his valuable services in arranging the tour and conducting the party through Belgium."

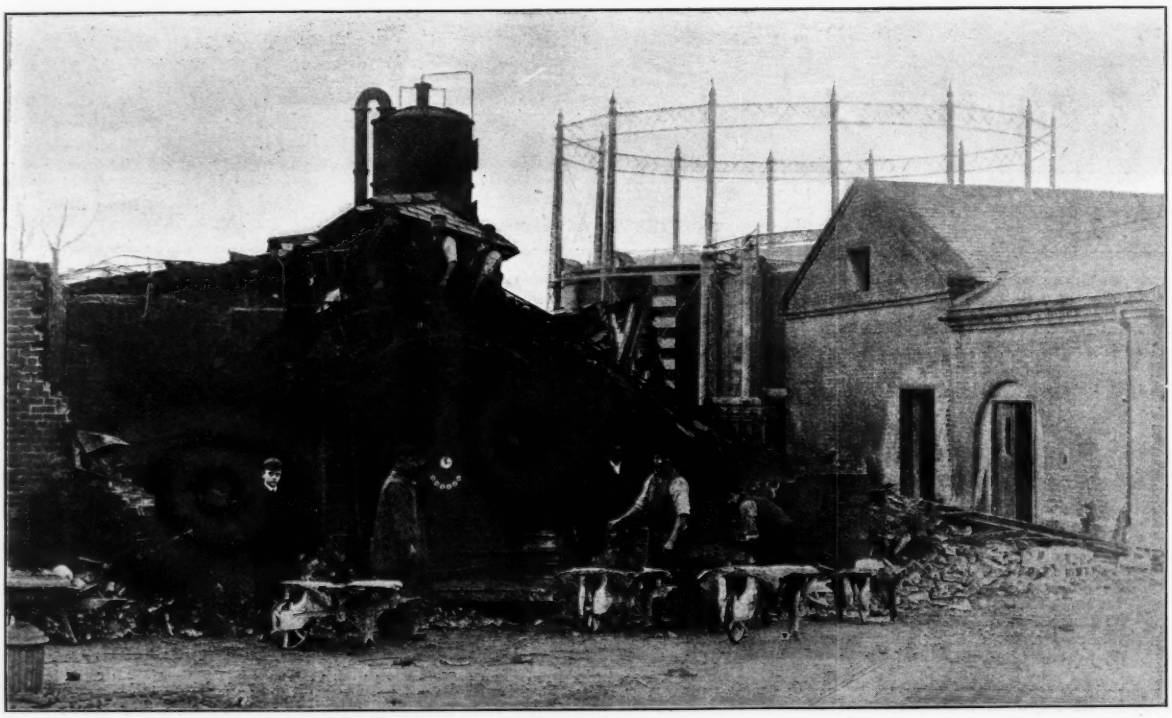
Dr. KEMNA, who was received with applause, made graceful acknowledgment. He thought a great deal of the appreciation of the members was due to the fact that they were favoured with good weather, and to his countrymen and friends, the Water-Works Engineers of Brussels, having done all they could to show how pleased they were to receive their visitors. He had been made the happy victim of happy circumstances. The beautiful present he should take home and keep in remembrance of the joyous days they passed together, and of the kindness he had received from the President personally and the Association generally. He also thanked the President for the words he had spoken in presenting the gift.

Votes of thanks to the President and Council of the Geological Society for the use of their rooms, to the authors of the papers, to the Scrutineers, and to the President, ended the proceedings.

EXPLOSION AT THE MILL HILL (HENDON) GAS-WORKS.

From Photographs taken by Captain F. W. Adams, of the Hendon Fire Brigade.

[See p. 855.]



Yorkshire Junior Gas Association.—We learn from the Secretary (Mr. Charles Roper) that a meeting of the Yorkshire Junior Gas Association will be held next Saturday, at the Technical College, Bradford, when a discussion upon naphthalene will be opened by Mr. J. H. Brearley, of Longwood.

The Question-Box.—We have received from Dr. Harrop, of Milwaukee, a copy of the first list of questions issued in connection with the 1905 edition of the Question-Box of the Ohio Gas-light Association, under the editorship of Mr. H. L. Doherty. The questions are divided into seventeen sections—viz., Gas-Making Materials, Manufacturing Equipment, Manufacturing Operation, Residuals, Manufacturing Chemistry and Physics, Storage, Distribution Supplies and Materials, Distribution Operation, Chemistry and Physics, Gas-Engines, Gas-Burning Appliances, New Business Methods, Accounting, Management, Legal Matters, Literature, and Miscellaneous. This is a comprehensive list; and the questions falling under each heading are even more so. Considerable attention is being paid to gas-engines.

The Life and Duty of Nernst Electric Lamps.—Tests have been made by Herr von Gaisberg, for the information of the Municipal Council in charge of the electric lighting of Hamburg, as to the behaviour of the new intensifying Nernst lamps with horizontal rods. At first, their illuminating power decreases considerably; then it remains constant for a long time; and finally it falls off rapidly. After 500 hours' use, there is a decrease of 15 per cent. with the 0·25-ampere lamps, and of 20 per cent. with the 0·5-ampere lamps, on their illuminating power after only 25 hours' use. The light falls off so rapidly after 500 hours that this practically marks their term of life. The lamps with vertical rods showed on 300 hours' use a diminution of from 24 to 30 per cent. in the light yielded; while their consumption per English candle rose in the same time from 1·37 to 1·94 watts. These figures, which are from an impartial source, show that the Nernst lamp, even in its latest developments, will not effect for electricity what the Welsbach mantle has done for gas. Allusion was made to the Nernst Company's affairs last week, p. 783.

CARBONIZING OVENS V. GAS-RETORTS.

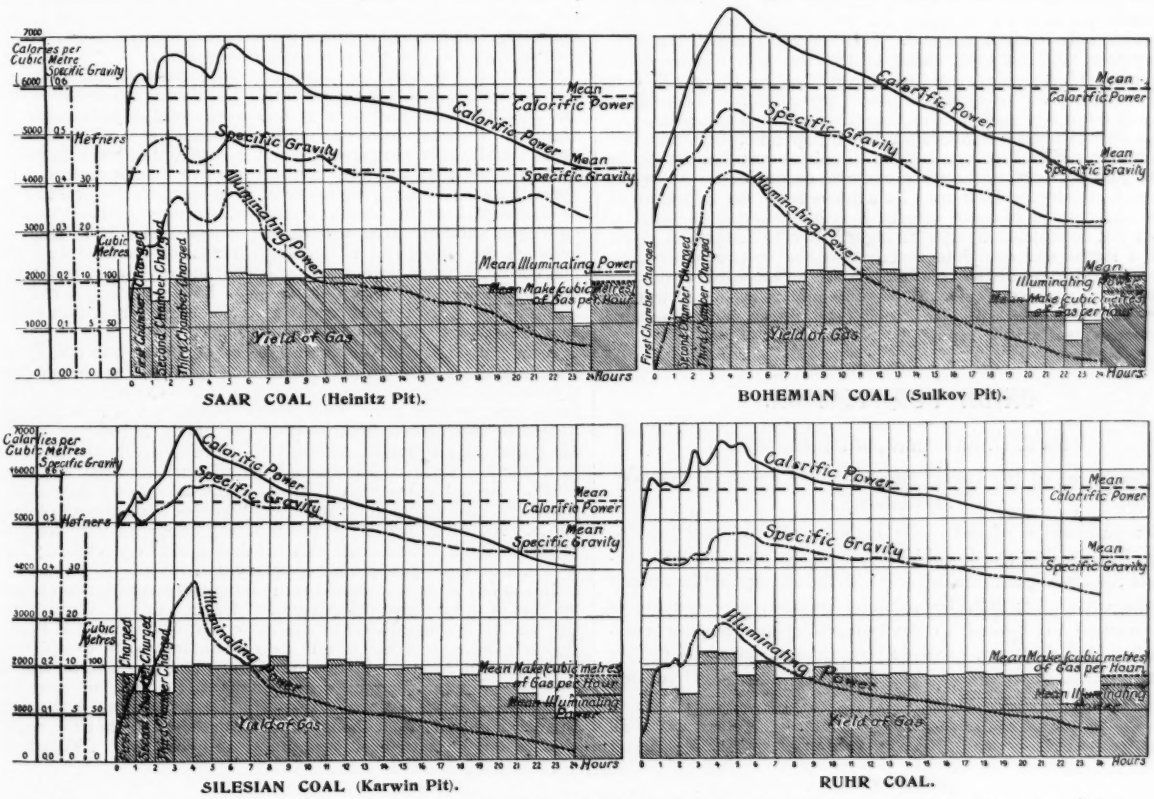
Trials at the Munich Gas-Works.

Reports of interesting trials of comparative results obtained from the carbonization of coal in ordinary gas-works retorts and in larger oven chambers have been presented by Herr H. Ries, the Manager of the Munich Gas-Works, at both the 1903 and 1904 meetings of the Bavarian Association of Gas and Water Engineers. Last year he was only able to report preliminary trials, which served mainly to establish the dimensions of the chambers which would furnish approximately the same output in a given time as a setting of eight retorts, which was chosen as the unit of productive capacity for the comparative trials. The necessary alterations have since been made to the bed of chambers; and this year Herr Ries was able to publish comparative results. We give below an abridgment of his reports, which have appeared in the "Journal für Gasbeleuchtung."

A setting, on the Munich system, of eight retorts was converted into a bed of three oven chambers. The substructure of the regenerator and the producer were left practically unaltered; but the upper part of the setting was converted into a three-chambered oven or bed, the chambers being set at an angle of 35°, in order to facilitate automatic charging and discharging. The chambers also widened out below and forwards to the discharging end, in order to avoid the sticking fast of the block of coke. The furnace gases played only on the sides and not on the tops of the chambers. The three ascension-pipes were provided with valves or dampers, and led into a common receiving main. The charging mouth was closed with one of Morton's lids, and below it was an opening for pushing out the block of coke to facilitate its discharge. The openings in the front of the chambers had wrought-iron doors, with an inside screen to prevent the charge of coal pressing too far forwards. The coal for a charge was in an overhead receiver, and passed through a funnel into the mouth of the chamber. The coke from the chambers moved down an inclined plane to quenching apparatus. The chambers, after the preliminary trials, were reconstructed, in order to bring them to the size requisite for carbonizing as much coal as a setting of eight retorts—viz., about 6½ tons in 24 hours. The coal receiver above each chamber then held a charge of about 2½ tons of coal, and the charging therewith occupied 15 to 20 seconds. Practically no inconvenience was caused to the operator by smoke or flame issuing from the charging mouth, because the large charge of coal lowered the temperature of the chamber to such an extent that no appreciable evolution of gas occurred during the time of charging.

The coal generally drops into the chamber in the required uniform layer without further help; and the evolution of gas takes place nearly at a uniform rate throughout the period of carbonization. There are thus no sudden calls upon the capacity of the subsequent apparatus; and blockages of the exit-pipes and the mains, and accumulations of tar within the chamber, do not occur. At the normal temperature of the bed, the coal is so completely worked off in 24 hours that the coke burns without flame. The block of coke will have shrunk away ½ inch to ¾ inch from the walls of the chamber, so that it will slide out in a few seconds without special assistance. In a few cases, when the heats have been too low, or the time of working off has been curtailed, incompletely carbonized tar on the bottom of the chamber has offered resistance to the movement of the coke. The deposits of scurf are less troublesome than with retorts. On the walls the scurf forms a thin uniform layer which is easily burnt off when the lids are open; but on and near the top of the chamber the deposit is thicker, but does not interfere with the working. Most of the coke comes out in big lumps of great hardness. The rapid removal and quenching of the large quantity of coke discharged from each chamber presents some difficulty.

For the trials, which were made with particular kinds of coal used at the Munich works, the gas from the chamber setting was kept apart from the remainder of the works production, and measured by a station meter. The observations included the yield of gas per 24 hours, and continuous readings of its illuminating and calorific power and specific gravity. Further, the temperature of the bed, the consumption of fuel, and the yield



SAAR COAL (Heinitz Pit). BOHEMIAN COAL (Sulkov Pit).

SILESIAN COAL (Karwin Pit). RUHR COAL.

CALORIFIC POWER, SPECIFIC GRAVITY, ILLUMINATING POWER (FLAT-FLAME), AND VOLUME OF COAL GAS FROM OVEN CHAMBERS—6½ TONS OF COAL CHARGED INTO THREE CHAMBERS.

1 Cubic Metre = 35·316 Cubic Feet.
1 Hefner = 0·877 English Sperm Candle.
1 Calorie = 3·968 B.T.U.

Description of Coal.	Saar.	Bohemian.	Silesian.	Ruhr.
Yield of—Coke, per cent. by weight of coal	70·52 (67·10)	63·89 (61·38)	69·18 (68·20)	70·81 (70·84)
Tar " " "	7·23 (6·10)	4·96 (8·05)	3·57 (5·58)	3·85 (5·67)
Liquor " " "	4·74 (5·76)	13·44 (10·34)	6·71 (5·50)	7·07 (4·20)
Gas, cubic feet per ton	10,790 (10,815)	10,030 (10,076)	10,464 (10,693)	10,094 (9502)
Candle power of batswing flame with a consumption of 5·3 cub. ft. per hour	9·06 (11·71)	8·64 (10·65)	6·08 (9·67)	6·67 (8·69)
Calorific power of gas at 32° Fahr. and 760 mm., B.T.U. per cubic foot	648 (680)	668 (682)	610 (648)	635 (657)
Specific gravity of gas at 59° Fahr. and 760 mm.	0·447 (0·460)	0·465 (0·449)	0·527 (0·468)	0·442 (0·412)

of bye-products were observed. The means of the results are recorded in the table, in which are also given (in brackets) for the sake of comparison, the average results obtained earlier by the carbonization of the like coals in retorts.

The yield of coke from the chambers was actually somewhat greater than shown, as there was unavoidable loss before it was weighed, and in any case it appears to be at least equal to, if not larger than, the yield from retorts. The chamber yield of tar is lower, but that of liquor higher. The ammonia in the liquor, however, has not yet been determined.

The yield of gas does not fall short of that from retorts, but its candle power is from 20 to 35 per cent. lower. Its calorific power is not more than 6 per cent. less, on an average. The falling off in illuminating power is not of importance to consumers, because of the wide dissemination of the Welsbach burner; but it would have been a serious detriment to the chamber gas if it had shown an equally great falling off in calorific power.

If the product of the make of gas and its calorific power is taken for the different kinds of coal, it will be found that there is in this respect very little difference between them. This fact is of great importance, because it indicates that the heating value of the total amount of gas obtained from a given quantity of coal is nearly the same, whatever the description of coal used. Thus, the following are the figures for the coals tested by the author:—

Kind of Coal.	B.T.U. in the Gas per Pound of Coal.
Saar	3120
Bohemian	2990
Silesian	2850
Ruhr	2860

The deviations from one another in these cases are scarcely 1 per cent. The oven chambers therefore promise not merely to make the gas-works independent of labour, but also to give still greater latitude in the choice of coal. The course of distillation for the four descriptions of coal tested in the ovens is shown in the diagrams, which give the make, the illuminating power, the calorific value, and the specific gravity of the gas throughout the time of carbonization.

The gas is evolved at a nearly uniform rate all through the 24 hours allowed for working off the charge, and gradually decreases only towards the end. The specific gravity, illuminating power, and calorific value of the gas rise rapidly after charging, and, according to the ease with which the coals carbonize, attain their maximum values in 3 or 4 hours. The values then fall off nearly uniformly until carbonization is complete.

The bed of oven chambers was an independent one, and the consumption of fuel for heating the chambers was therefore high —viz., 18·2 per cent. of the weight of coal carbonized. As to the economy of labour which may be achieved by the adoption of oven chambers in place of retorts, it is obvious that it must be great; but conclusive figures in regard thereto cannot be given until a larger and complete installation has been in operation. The favourable results so far obtained are an incentive to pursue the trials on a greater scale. It was intended to erect and work a large plant this year at the Kirchstein Gas-Works, and the results obtained with it will be reported in due course.

OXIDE PURIFICATION.

By E. H. Earnshaw, of Philadelphia.

[A Paper read at the Annual Meeting of the American Gaslight Association.]

The purification of gas really includes all the processes to which illuminating gas is subjected, from the point of manufacture of the crude gas to its delivery into the storage holders ready for the consumer; but, by common consent, the meaning of "purification" is limited to the removal of the sulphur compounds. In this paper, I wish to limit the definition still further to the removal of sulphuretted hydrogen by means of hydrated oxide of iron.

Owing to the paramount necessity of delivering clean gas at all times, irrespective of possible limitations of purification apparatus, it has always been a difficult matter to investigate the purification problem in all its bearings. There are, therefore, many undetermined questions which will at once occur to all—such as the proper size and arrangement of the purifying boxes, the best kind of oxide to use, the influence of varying rates of flow, different amounts of sulphuretted hydrogen in the gas, the use of air for revivification, and many others. Local conditions affect purification results to such an extent that it is quite possible to obtain corroborative evidence that almost any system of purification is the proper one to use. In small works the total outlay for purification is so small that time and money spent in investigation would scarcely be justified; but in large works this item amounts to an important sum in the course of a year. All works, whether large or small, are vitally interested in obtaining the greatest purification capacity for the least outlay, as the interest on the cost of installation is usually the heaviest item in the total purification cost.

The objects to be sought for in any system of purification are the minimum cost of purification per 1000 cubic feet, and the maximum purification capacity at the minimum cost for installation. The cost of purification is made up of two items essentially different, and they must be considered separately.

Cost of Material.

For a given price per bushel, the ultimate cost of oxide per 1000 cubic feet is controlled by the amount of sulphur the oxide takes up before it has to be discarded. It is important to remember that this cost is not affected by the method of using the oxide; that is to say, whether a bed is taken out of the box and revivified, or whether by the use of air, or some other method of revivification in place, the oxide remains in the box until it is completely exhausted, the ultimate cost per 1000 cubic feet is the same. But of two oxides costing the same figure per bushel, and capable of ultimately taking up the same amount of sulphur, that is the more valuable which will take up the greater weight of sulphur between the revivifications. Whenever purification capacity is at all limited, an oxide sensitive to small amounts of hydrogen sulphide in the gas will be of special value in increasing the quantity of gas that can be purified by a given set of boxes. We do not know definitely, but there is a strong presumption that these two desirable qualities will be found associated together.

The kind of oxide to be employed is a question capable of being approached from several directions. Local conditions may make one kind of oxide desirable at one works and objectionable at another. In many works the purifying boxes are worked at high speed; and under such conditions it is essential to have an oxide that is open, and will not cause excessive back-pressure. In general, so far as purifying material is concerned, the problem is to discover how to obtain an oxide, strongly active towards hydrogen sulphide, that will take up large amounts of sulphur between the shifts, and to accomplish this for a moderate price per bushel. It has been our practice for many years to manufacture oxide from planer chips and iron borings, using a certain amount of salt to promote oxidation. Sometimes we got an oxide that did good work, sometimes we did not.

A careful study of the conditions of oxidation has taught us that to make a good oxide there must be plenty of water present during the entire period of oxidation, and the temperature of the mass must be kept low. This means the addition of iron borings in four or five instalments, keeping the batch thoroughly wet at all times, and frequent turnings to prevent overheating. The iron borings must be fine enough to all pass through a $\frac{1}{8}$-inch mesh. An oxide made in this way is the colour of yellow ochre when dry, and should not contain any lumps or hard masses of iron oxide. An oxide made by decomposing copperas with lime is probably the best and most efficient that could be produced; but it would be too expensive for ordinary use.

In the fall of 1902 we made some laboratory experiments to get an idea of the relative efficiency of different oxides. We sent to the various manufacturers of oxides for samples, and tested them, together with an oxide of our own manufacture, by completely fouling small samples in test purifiers. The oxide to be tested was carefully analyzed and a sample placed in a calcium chloride jar, holding about a quart. Unpurified gas was passed through the oxide until tests at the inlet and outlet showed that the oxide was no longer removing any sulphuretted hydrogen. The sample

Table I.

Analysis of Oxide.	No. 1.		No. 2.		No. 3.		No. 4.	No. 5.	No. 6.	No. 7.
Weight per bushel, dry	25·0		23 0		31·0		10·4	26·1	39·0	32·7
Total iron per bushel, pounds	12·5		10·2		17·75		1·25	11·8	17·4	16·2
Oxidized per bushel, pounds	11·6		7·9		12·5		1·25	11·8	17·4	16·2
Possible sulphur per bushel, pounds, based on oxidized iron	9·9		6·8		10·73		1·07	10·1	14·9	13·9
	(*a*)	(*b*)	(*a*)	(*b*)	(*a*)	(*b*)				
Pounds of sulphur taken up per bushel, first fouling	2·61	2·57	0·96	1·85	1·26	1·45	1·11	8·0	6·28	5·02
Efficiency	26·3 p. ct.	26·0 p. ct.	14·1 p. ct.	27·2 p. ct.	11·80 p. ct.	13·5 p. ct.	100 p. ct.	79·3 p. ct.	42·1 p. ct.	36·2 p. ct.
Do., second fouling	1·79	1·55	0·84	1·82	1·39	1·05	0·29	..	..	..
Efficiency	18·0 p. ct.	15·6 p. ct.	12·3 p. ct.	26·7 p. ct.	12·9 p. ct.	9·8 p. ct.	27·1 p. ct.	..	..	..
Do., third fouling	..		1·19	..	0·79	..	0·59	..	..	..
Efficiency	..		17·5 p. ct.	..	7·4 p. ct.	..	36·4 p. ct.	..	..	..

of oxide was then revivified and analyzed, and its efficiency expressed as a percentage, comparing the actual amount of sulphur taken up with the theoretical quantity that should be taken up by the amount of iron present. The results obtained are given in Table I.

Sample No. 1 was our regular oxide in use at that time, made by us from planer chips and iron borings. Samples Nos. 2 and 3 were oxide of the same general character as No. 1, and received from well-known manufacturers. Sample No. 4 was made by us from copperas alone, without any iron borings. Sample No. 5 was a bog iron ore. Samples Nos. 6 and 7 were in the form of a very fine powder mixed with sawdust. These two oxides did very good work on the first fouling, but we were unable to foul them a second time on account of back-pressure. The low efficiency of most of the samples of oxide is particularly noticeable.

The bog iron ore gave such a high efficiency in this test, that we purchased enough to make up two regular batches. The results were disappointing, since the fineness of the iron ore gave rise to back-pressure, and both batches were discarded for this cause before they had taken up enough sulphur to show economy. The oxide made from copperas alone gave very interesting results. On the first fouling, the oxide took up 100 per cent. of the theoretical amount possible. On the second fouling, the amount taken up was very small; and on the third, while it was greater than on the second, it was only about one-third of the theoretical quantity. A chemical examination of this oxide revealed the fact that the greater portion of the original oxide had been changed to cyanides, and consequently was incapable of further purification. To get a larger proportion of the iron in the form of an oxide chemically active to hydrogen sulphide is the chief problem in the manufacture of oxide; and we have found the secret to consist in keeping the mass thoroughly wet and cool at all times during the process of oxidation.

The following table gives the results of some fouling tests recently made with a view to determining whether the liberal use of salt during oxidation would have any beneficial effect on the character of the oxide produced.

TABLE II.

Analysis of Oxide.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Weight per bushel, dry, pounds .	26·30	25·90	26·20	27·90	27·70
Total iron ,, ,, ,, .	12·90	12·30	11·70	11·80	15·00
Possible sulphur per bushel, pounds, based on the total iron	10 90	10·40	9·90	10·00	12·70
Pounds of sulphur taken up per bushel	5·69	6·18	3·82	4·63	6·55
	P. Ct.	P. Ct.	P. Ct.	P. Ct.	P. Ct.
Efficiency	52·20	59·40	38·60	46·30	51·50

No. 1 was made without using any salt; No. 2, with ½ lb. of salt per bushel of oxide; No. 3, with 3 lbs. of salt; No. 4, with 5 lbs. of salt; and No. 5 is a sample of our regular oxide, made with about ¼ lb. of salt per bushel. This sample was taken from the reserve batch and set aside for use in the experimental plant.

It was intended to have 15 lbs. of iron per bushel in the experimental samples of oxide; but, by some misunderstanding, the finished oxide contained less than this amount. It is quite evident, however, that no benefit is to be obtained from the use of large proportions of salt. Our regular oxide is made with about ¼ lb. of salt per bushel, to promote oxidation; and the duty in this test compares reasonably well with that obtained from the experimental batches made with little salt. Two years ago the best efficiency obtained from the regular oxide in use at that time was 27·2 per cent. An increase to 51½ per cent. shows a very great improvement in our methods of making oxide.

COST OF LABOUR.

This item is directly proportional to the quantity of gas that can be purified per bushel of oxide between revivifications, and is affected by many conditions. With a gas of fixed composition, and an oxide of given quality, the conditions affecting the cost of purification labour are: Rate of flow of gas through the purifiers; number and arrangement of the boxes; temperature of purification; partial or complete revivification in place by the use of air; and mechanical facilities for handling the oxide.

Rate of Flow.—It is evident that if the oxide in the first box can be kept in use until no more sulphur is taken up by the oxide, any reduction in the rate of flow cannot effect an improvement in purification labour. On the other hand, if the rate of flow is increased so that the gas shows foul at the outlet box, while the oxide in the first box is still capable of taking up sulphur, the cost of purification labour will be increased in proportion to the amount of work the oxide is still capable of doing when it is taken off for revivification.

Within the last year, at the Philadelphia Gas-Works, an experimental coal-gas plant has been erected, including in its equipment a set of four purifying boxes, 8 ft. by 6 ft., each holding a layer of oxide 30 inches deep. These boxes are arranged so that air for revivification may be admitted to the gas at any point, and the direction of the flow in the boxes may be reversed at will. Further equipment of exhauster, governor, station meter, sampling devices, and photometer-room make this plant unusually well adapted for the investigation of certain problems connected with purification.

We started with the idea of getting conclusive data on a number of purification questions, and to this end a comprehensive scheme of investigation was projected. As usually is the case, lack of time and other circumstances beyond control interfered with the programme, and very little of all that was planned has actually been accomplished. Nevertheless, some results have been obtained which, though limited in scope, are of sufficient interest to justify their presentation in some detail.

A batch of about 4000 bushels of oxide was set aside to be used in all the experiments, in order to eliminate any error due to variations in quality. This was an oxide made at our works from planer chips and cast-iron boring only, and it analyzed as follows: Weight per bushel (2150 cubic inches) dry, 26·1 lbs.; actual iron per bushel, 13·7 lbs.; theoretical amount of sulphur possible to be taken up at one fouling without air, 11·7 lbs.; with coal gas containing 350 grains of sulphuretted hydrogen per 100 cubic feet, equivalent to purifying per bushel 23,400 cubic feet; with water gas containing 175 grains of sulphuretted hydrogen per 100 cubic feet, do. 46,800 cubic feet.

It was planned to study the effect of variations in the rate of flow as follows: Boxes to be freshly filled with oxide, and coal gas passed through at a definite rate of flow, which will be maintained constant by means of a speed regulator on the exhauster. Boxes will be run in the usual way, calculating from frequent observations the amount of sulphuretted hydrogen being taken out; observations for record beginning as soon as sulphuretted hydrogen is indicated by the test-paper at the outlet of the third box. Shifts will then be made regularly, governed by tests at the outlet of the third box, until a regular duty per shift has been established. The efficiency of the oxide under these conditions will be determined by the amount of sulphur per bushel removed between the shifts, and may be expressed as a percentage of the amount of sulphur taken out per bushel compared with the theoretical amount required to completely foul the oxide. Other experiments will be made in the same way, but with different rates of flow. By repeating the same experiments, using water gas instead of coal gas, the effect of diminishing the original amount of sulphuretted hydrogen can be determined.

Experiments on Rate of Flow.—In accordance with this scheme, the boxes were filled with the reserved oxide, and gas passed through them at the rate of 5000 cubic feet per hour, equivalent to a factor of 0·4 of a square foot area per 1000 feet per 24 hours. The actual test began when the boxes had arrived at a normal state of work, which was not until the first shift was made. Daily tests were made at the outlet of each box, to determine the amount of sulphuretted hydrogen in the gas. The amount of sulphur taken out by each bed was calculated from these daily determinations, and checked by analyses of the oxide after fouling. The results of the tests at this rate were as follows:—

TABLE III.

Oxide Batch.	Pounds Sulphur Taken Out per Bushel.	Cubic Feet Gas Purified per Bushel.	Efficiency. Per Cent.
No. 2	1·66	4986	14·1
No. 3	1·89	5630	16·1
No. 4	1·72	4722	14·7
Average	1·76	5112	15·0

The rate of flow was then reduced from 5000 cubic feet to 4000 cubic feet per hour, equivalent to a factor of 0·5; and the results obtained were as follows:—

TABLE IV.

Oxide Batch.	Pounds Sulphur Taken Out per Bushel.	Cubic Feet Gas Purified per Bushel.	Efficiency. Per Cent.
No. 7	2·83	8182	24·2
No. 8	2·21	5912	18·5
No. 9	3·10	7023	26·5
No. 10	2·94	8987	25·1
Average	2·77	7526	23·6

Thus, by decreasing the rate of flow 20 per cent., the relative efficiency of the oxide was increased 57 per cent. These are the only experiments on the rate of flow we have been able to complete as yet, owing to lack of time. The results clearly show that further investigation will be well repaid.

Number and Arrangement of Boxes.—Until a few years ago, the only way of controlling the operation of a purifying plant was by means of lead acetate papers; and this test gave but a slight indication of the quantity of sulphuretted hydrogen present in the gas. It was, therefore, generally supposed that when the gas at the outlet of the first box (usually called the "foul box") contained enough sulphuretted hydrogen to immediately blacken the papers, the main work of purification had been transferred to the second box.

The invention by Mr. C. C. Tutweiler of a rapid method of determining the number of grains of sulphuretted hydrogen in the gas at any point was the means of destroying for us many preconceived ideas as to the ordinary operation of a set of purifiers. When we first began to study purification with the assistance of the iodine burette, we were very much impressed with the great amount of work done by the first box of the series. The first bed does nearly all the work, usually even up to the time when it is taken off as "foul." For some reason, as the number of grains of sulphuretted hydrogen becomes smaller, it is increasingly difficult to purify the gas. It sometimes takes a greater

volume of oxide to remove the last 10 per cent. of sulphuretted hydrogen than to take out the first 90 per cent.

To overcome this difficulty, and to allow the oxide in the first box to be used up more completely, the remedy that naturally suggests itself is to place additional boxes in series to take up the small amount of sulphuretted hydrogen that seems to string out through the boxes for such a long distance. In Philadelphia, the coal gas and water gas are purified separately; and it so happens that at our Point Breeze works two sets of coal-gas purifying boxes are arranged so that they can be connected in tandem; that is to say, the outlet of the centre-seal governing one set of boxes is connected with the inlet of the centre-seal governing the other. We have utilized this arrangement during the past three years to experiment somewhat fully on the relative merits of running these two sets of boxes parallel or in series; and the results have been at all times extremely in favour of the latter method. Until recently, we have been unable to run the boxes in series when making a large quantity of coal gas, on account of the back-pressure; but last spring the necessary changes were made to permit us to do so at all times.

During the winter and spring of this year, running the boxes parallel, we found it necessary to make a shift at each house about once a week, giving a duty of approximately 4000 cubic feet of coal gas, equalling about 2 lbs. of sulphur per bushel of oxide between the shifts.

On the 4th of April, the two purifier houses were placed in tandem, no other changes being made. In the next few months the shifts (made on account of back-pressure) were as follows:—

TABLE V.

Date of Shift.	Approximate Cubic Feet Purified per Bushel.	Pounds of Sulphur Taken Up per Bushel.	Date of Shift.	Approximate Cubic Feet Purified per Bushel.	Pounds of Sulphur Taken Up per Bushel.
April 24	15,000	7·73	July 28	24,000	12·71
May 23	17,500	8·80	Aug. 26	31,000	18·89
,, 26	18,500	9·24	Oct. 3	36,000	23·17
July 21	40,000	20·40			

It is especially notable that all of these shifts were made on the inlet-house; that is to say, the fresh box always came in the third position, while the fourth, fifth, and sixth boxes remained unchanged. During this time, and also during the period before placing the boxes in tandem, from 2 to 2½ per cent. of air was admitted to the exhauster inlet. When these boxes were placed in tandem for the first time, in December, 1901, no shift was made on the outlet-house for a period of more than three months, though we were using at that time a West Virginia coal, giving us from 800 to 1000 grains of sulphuretted hydrogen at the inlet to the purifiers. Even under these conditions, the actual amount of sulphur taken up by the last three boxes was comparatively small. This at once suggested the thought that great economy in the original cost of construction could well be obtained by the use of catch boxes of inexpensive construction; but I will refer to this matter again more fully. We have employed this system of purification for coal gas at both our works in Philadelphia with a very marked improvement in purification results.

It will be noticed in connection with Table V. that the reason for making the shift was in all cases back-pressure, and in no case because the gas was shown to be dirty at the outlet of the last box. This matter of back-pressure has been, and continues to be, a source of great annoyance to us, and is the factor which more than anything else tends to limit the life of the oxide. The back-pressure always shows itself in the first box; and when it once starts to show, it accumulates very rapidly, and soon necessitates a shift. It is evidently due to the deposition of sulphur in the lower layers of oxide—probably in the extreme lower layer where the most energetic action takes place, since it is at this point the gas richest in sulphuretted hydrogen and richest in free oxygen first meets the oxide. To make the conditions still worse, the oxide at this point has to stand the entire weight of the oxide in the box; and the free passage of gas is interfered with by the presence of the trays. The life of the oxide measured by the absence of back-pressure would undoubtedly be greatly prolonged if the inlet-pipe were at the top and the outlet at the bottom of the box. The greatest deposition of sulphur would then take place at the top of the oxide, where it would be free to expand without interference by the weight of the oxide or by the narrow openings in the trays.

Table Va. gives the results, in grains per 100 cubic feet, of tests made on the six boxes in tandem at the Point Breeze works for a few days before the shift was made on Oct. 3, showing that the oxide in the first box was taken out while it was still capable of removing nearly 50 per cent. of the total sulphuretted hydrogen in the gas.

TABLE Va.

Time	9.29	9.30	10.1	10.2
Inlet to purifiers	530	540	520	580
Outlet 1st box	230	250	230	280
,, 2nd ,,	45	40	50	70
,, 3rd ,,	20	20	25	25
,, 4th ,,	5	5	5	5
,, 5th ,,	0	0	0	0
,, 6th ,,	0	0	0	0

(To be continued.)

NEW GAS-GRILLERS.

Since the opening of the gas exhibition, Messrs. S. Clark and Co. have added to their stand samples of two new grillers which they are now introducing. These contain what we believe are unique features. One is called the "Perfection" gas grill; and any of its three sizes will be found useful for restaurants, hotels, or domestic use. The illustration shows its form. But the chief point about it is that below the grill there is a bed of loose fire-clay, which presents a clear and uniform incandescent fire to the meat, and is regarded by the makers as being preferable to the coke-fire grill which is so commonly used in restaurants. Another point is that the grill is inclined, and the upper surfaces of the

THE "PERFECTION" INCANDESCENT GAS GRILL.

bars are grooved, so that the gravy flows down into the enamelled trough-like fitting in front. The grill is provided with handles for easy and safe removal; and supports are provided so that it can be raised or lowered as necessary. In the larger sizes, below the fire-bed, there is an oven, with drop door, and fitted with a shelf, which can also be raised or lowered as required. It is a neat arrangement; and the makers feel confident as to its success.

THE "CANONBURY" GRILLING-STOVE.

The second griller—this is the "Canonbury"—has the appearance of one of the ordinary type; but its feature is that it can be simply lifted apart for cleaning purposes, and (it follows) any part is renewable. Attention is called to the patent deflecting-plate for toasting and grilling, and to the simplicity of the grilling adjustment. The plate for deflecting the heat is thrown into position by a touch of the hand, and can be immediately dropped by a reverse movement.

REGISTER OF PATENTS.

Discharging Coke from Retorts and Cooling the Same.—Waddell, Alex. and Forbes, of Dunfermline. No. 24,756; Nov. 14, 1903.

This invention consists of a vessel revolving on trunnions or axle, on which it may be made to travel, having only one opening, parallel to the axle and coincident with a hollow frame placed immediately over it. It is also provided with a draining tray. Hot coke, as drawn from the retorts, falls through the opening and is cooled in the vessel by water sprayed from the hollow frame on to the coke. The steam, as formed, expels the air; and, as the vessel is air and water tight and has a comparatively narrow opening, the re-ignition of partially cooled coke is prevented. By rotating the vessel, the cooled coke is delivered into a manual or mechanical conveyor or other receptacle; the breeze or coke dust is collected on a wire gauze or other suitable tray; and the water which has not been evaporated passes through the tray into a separate chamber. The breeze is then removed by hinging back or lifting out the tray; the tray is replaced; and, by rotating the vessel to its position for receiving coke and water, the water which is in the separate chamber is brought into position for further use.

Fig. 1 is an end elevation of the vessel in the position for receiving coke. Fig. 2 is an end elevation of the vessel in the position to discharge coke, showing a side elevation of one mechanical arrangement for rotating the vessel, and also the chamber for collecting water and the wire gauze for collecting coke breeze.

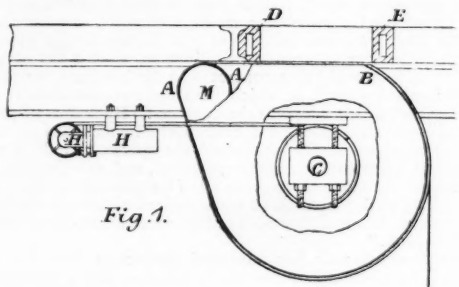


Fig. 1.

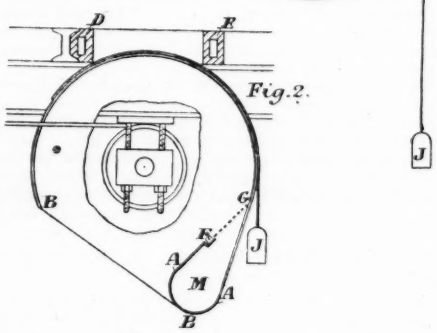


Fig. 2.

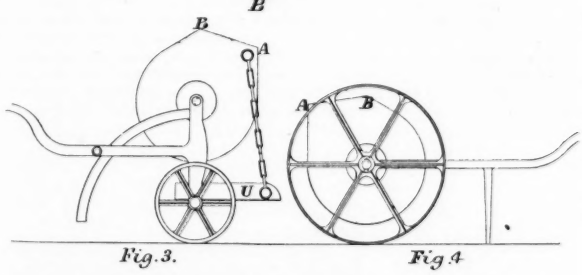


Fig. 3. Fig. 4

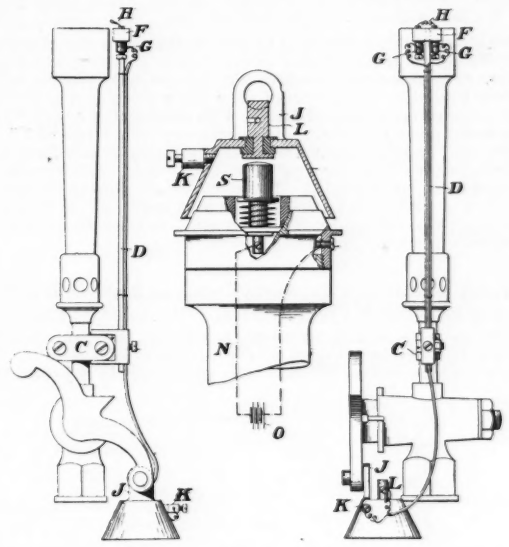
Coke falls from the retorts into the vessel in position shown in fig. 1, and water is sprayed from the hollow frame D E, and the coke is in this way quenched. The vessel is then rotated on its bearings C by hand or by a hydraulic ram H, or other suitable arrangement, to the position shown in fig. 2. This motion discharges the coke contained in the vessel; but the breeze is caught on the tray F G, and the water which has not been evaporated by the heat of the coke flows into the chamber M formed on the vessel. The tray has bars to assist in more thoroughly separating the breeze and water before the discharge of coke. The weight J rotates the vessel (when it is emptied) to the position shown in fig. 1. Fig. 3 shows the means by which the coke may be received from the retorts into the quenching part A B, therein cooled, and thereafter conveyed on wheels to the place where it is to be delivered. U is a shoot which is allowed to fall and guide the coke as it is being discharged into the narrow openings. Fig. 4 shows one of the cooling vessels mounted on wheels and frame for the purpose of depositing the coke, after it is cooled, in the yard.

Lighting Gas-Burners by Electricity.—Duckham, A. M'D., of Upper Parkstone. No. 27,497; Dec. 15, 1903.

The patentee proposes to provide the burner or lamp with electrical contacts from which conductors are to be led to a point above the burner where they terminate either in a wire to be heated by the electric current or in a spark gap. Leading to the contacts is a hollow guide into which the person lighting the lamp pushes a rod having electrical contacts on it. When the latter touch the contacts on the lamp, a circuit is completed through the wire or spark gap above the burner from any source of such current—preferably one carried on the rod or by the person and, if desired, controlled by a switch.

The illustration shows a front and side view of an incandescent gas-burner with the invention applied to it; also (on an enlarged scale and partly in section) the guide and the head of the torch or rod.

To the burner is attached a holder C for a rod D, which is secured at a suitable height by a clamping screw. The rod carries a non-conducting top F, of steatite, in which are inserted terminals G for



conducting wires, and also for the wire H to be heated, or a spark gap device, constituting a lighting device. I is a guide or socket attached to the gas-cock in any suitable manner so as to be insulated from it. The guide may consist of a conical metal socket having a terminal K for one conducting wire, integral therewith, and a second terminal L for the other conducting wire, insulated therefrom. N is the torch or rod which may be provided with a battery O and suitable conducting wires. The head of this torch is of conducting material provided with a terminal to which the wire from one pole of the battery is attached. It also has an insulated spring contact S with which the wire to the other pole of the battery is connected.

When it is desired to light the burner, the torch-head is inserted in the guide I, and, being pushed upwards, causes contact between the various parts—thus completing an electric circuit, the effect of which is to heat the wire H or produce the spark by which the gas will be lighted. The upward movement of the torch will also move the lever of the gas-cock and turn on the gas.

Bodies Adapted for Lighting Purposes and Rendered Incandescent by Heat or Electricity.—Ladd, J. H., of Surbiton Hill. No. 25,698; Nov. 24, 1903.

This "improved illuminating body or material is produced from flints subjected to the action of intense heat produced preferably by burning a gas free from impurities, although in some instances an electric furnace for heating the flints may be used. The temperature to which the flints are heated is from 4000° to 6000° Fahr., at which temperature the metallic elements present in the flints are vaporized or eliminated, and a product is obtained consisting of 98·5 per cent. or thereabouts of pure silica with only a trace of calcium." This product is reduced to powder, and to it is added a small proportion of a mixture of tar and portland or like cement, or of a mixture of kaolin or bauxite and water—sufficient to bring it to a consistency suitable for kneading. It is then thoroughly kneaded and moulded to the desired shape.

For example, if the body is to be used as an incandescent mantle for a gas-burner, the shape would be a conical shell, preferably perforated with a number of small holes. The article thus produced is next submitted to a moderate heat (preferably in a gas-furnace) to dry it slowly; and as soon as the moisture has been eliminated, and while the shapes are still more or less soft or pliable, they are removed from the furnace and immersed in a bath composed of a strong solution of suitable salts—*e.g.*, nitrates—of zirconium and lanthanum in about equal proportions, or of salts of other rare earth metals, such as thorium, beryllium, yttrium, cerium, &c., or of other substances (as salts of calcium) which, when ignited, increase the light-emitting power of the mantle or body.

The articles are next again submitted to a moderate heat—for example, a temperature of about 750° Fahr., for 48 hours and upwards, according to their size and thickness; the temperature being finally and gradually increased to 3500° or 4000° Fahr., and maintained thereat for about four hours. The articles are then allowed to cool down slowly, and on removal from the furnace, they are ready for use.

They are "hard and durable, and can be moved about either hot or cold without fear of breaking them." Used as mantles on a bunsen

burner, "they give a most brilliant light, and they are practically indestructible by heat."

In some instances, in making up the paste to be kneaded, any of the above-mentioned solutions may be used in lieu of water, or the oxide of one or more of the rare earth metals may be used in addition to water, or one of the solutions together with an oxide.

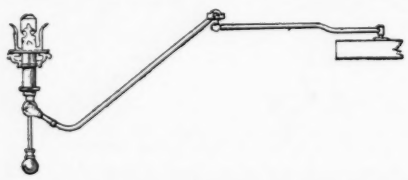
In the illustration is shown in central longitudinal section a perforated conical shell made of the material described, and suitable for use as a mantle for an incandescent gas-burner.

Mantles of Incandescent Gas-Burners.—Johnson, T. K., and M'Kean, W., of Glasgow. No. 753; Jan. 12, 1904.

The object of this invention is to coat the mantles with a chemical so as to strengthen them and also increase their durability and lighting power. The patentees propose to take any ordinary mantles and dip them in a solution of sulphate of alum for a short time until coated. They are then taken out and dried. This treatment, it is said, "makes the mantles much stronger, and also increases their luminosity." Preferably they make a saturated solution of sulphate of alum, into which the mantles are dipped for a period of about eight minutes or so, and are then taken out and dried. If desired, before dipping the mantles, the alum water may be strained to remove impurities. It is found, in practice, that good results can be obtained by dissolving about ¾ oz. of sulphate of alum in one pint of cold water.

Retaining Incandescent Gas-Burners when on Brackets in a Vertical Position.—Hendry, J., of Hamilton, N.B. No. 1025; Jan. 15, 1904.

This invention consists (as shown) of a nipple inserted into the gas-bracket and having a second nipple or burner jointed to it, which carries the incandescent burner. The second nipple is jointed to the



first one in such a manner that it can readily swing or turn round. Preferably the second nipple has a ball with a circular groove or hollow in it; and this ball fits on a plug with a gas-passage in it projecting from the first nipple. Fitted to the ball is a rod with a weight at its lower end, adjustable upon the rod and provided with a pinching screw.

Charging Gas-Retorts.—Deighton, G., of Harrogate. No. 1053; Jan. 15, 1904.

These improvements in means for use in the manufacture of gas consist in arranging and constructing same so that the "functions desired" are "easily and quickly performed."

The illustrations show a front and end elevation of a receptacle or "truck" constructed in accordance with this invention and upon which are mounted the improved devices referred to.

The receptacle A, for containing the coal to be fed to the retorts, is mounted upon two wheels of comparatively large diameter, arranged about centrally beneath it to receive practically the full weight of the truck and its contents. Smaller wheels are mounted on each side of the other wheels to maintain the equilibrium of the truck. Upon the axle of the larger wheels a bevel wheel is fixed, so as to transmit motion to propel the truck A upon its rails as desired. The bottom of the truck is formed at an angle; while openings or slots at different heights are made in the front wall, and there are covers or sliding doors G, which operate in front of them when moved as by the operating hand levers H.

Mounted to slide vertically on bearings or guide-pieces secured to the front edges or corners of the truck A is the framework M provided with rollers or runners, one of which is supported by the framework M by means of a rod, which is suspended from the rail which forms an extended part of the framework, and upon which rail it is arranged to travel by anti-friction pulleys. The runners are made to receive the coal carrier or scoop N, which is formed of an appropriate cylindrical shape at its rear end, while its projecting or extending end has a portion of its wall cut away to leave an opening through which the coal is supplied to it, and from or by which it is discharged. By the scoop being of this formation, it is enabled to travel over its carrying runners freely when tilted to one side or the other; since the surface it presents to the runners at such times is comparatively straight and even. To the rear end of the scoop is secured the handle by which the operator may push it backward or forward over its runners, or turn it about its own axis as and whenever desired.

Mounted upon hinged bearings Q, supported by the framework M, is an additional roller or runner R, which may be brought into the position shown in fig. 1 when the truck is opposite a retort desired to be charged, or which, by its hinged bearings Q, may be turned out of such position clear of the retort to allow the truck to freely travel in front when required. The runner is for affording support to the scoop when passed into the retort, and that at a point as far as possible from the handle, for the purposes hereafter explained.

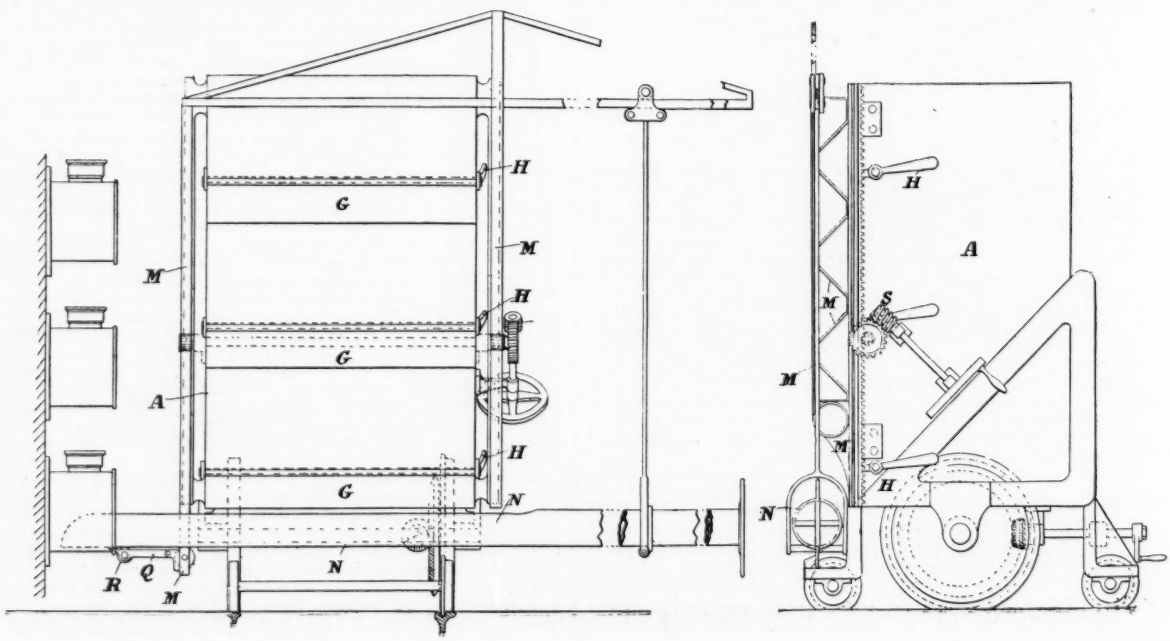
In making use of the apparatus, the truck A, on being filled with coal, has its framework M raised (by the worm S being operated) to its highest position in which it is in front of the highest retorts. On the scoop being filled, the operator moves it forward to enter the retort, at which time its forward movement is permitted by the runner allowing it to travel over it for a desired distance, when a projecting flange on the scoop is brought into contact with the bearings, which are then carried forward with it, at which time the runners allow it to travel along the rail which supports the bearings. By means of the runner being allowed to advance with the scoop, and by means of the additional runner R being mounted as described, the operator handling the scoop is "enabled more easily to keep control of, and to effect the counterbalancing of, the scoop throughout all of its paths of motion; hence he is enabled to push the scoop as far as desired within the retort without in any way relying upon the base of the retort to render support at any part of its path."

When the operator has advanced the scoop into the retort as described, he revolves it to deposit its contents, and withdraws it to be refilled. During its withdrawal, as he can still control it and keep it in any desired position, he can move it clear of the coal that it had previously deposited without disturbing the coal "in any way that may be afterwards found detrimental."

After filling the highest retorts, the framework M is lowered so that the scoop is brought opposite the second tier of retorts, at which time it is in position for receiving coal by the opening of the middle doorway G. Thus the charging of the retorts at this height may be carried out. When this operation is again completed, the framework M is again lowered and brought opposite the lowest retorts, at which time coal is supplied thereto through the moving of the lowest door G until completed, or until all the coal is withdrawn from the truck A.

Incandescent Gas-Burners.—Beaumont, T. A., of Broadbottom, Cheshire. No. 1511; Jan. 21, 1904.

The object of this invention is to prevent fluff, dust, or dirt from passing into, or depositing on, incandescent burners, especially when used in cotton mills, or positions where "it is now impracticable to use incandescent gas lighting, owing to the tendency of such burners to become quickly rendered inoperative caused by floating particles of fluff and dirt stopping up the gas and air supply, and also the gauze or perforations at the top of the burners." The patentee proposes to provide what may be termed an intercepting chamber, of fine wire



gauze, perforation, or other suitable material, made in two halves for facility of fixing and internal inspection, and of various shapes to suit the contour of different forms of burners. The chamber is so constructed that, when fixed, all the air passing through the burner is cleaned of any floating particles it may contain. The risk from fire is said to be reduced in this way to a minimum in textile manufactories.

Hydraulic Main.—Lake, H. H.; a communication from E. N. Trump, of Syracuse, U.S.A. No. 4585; Feb. 24, 1904.

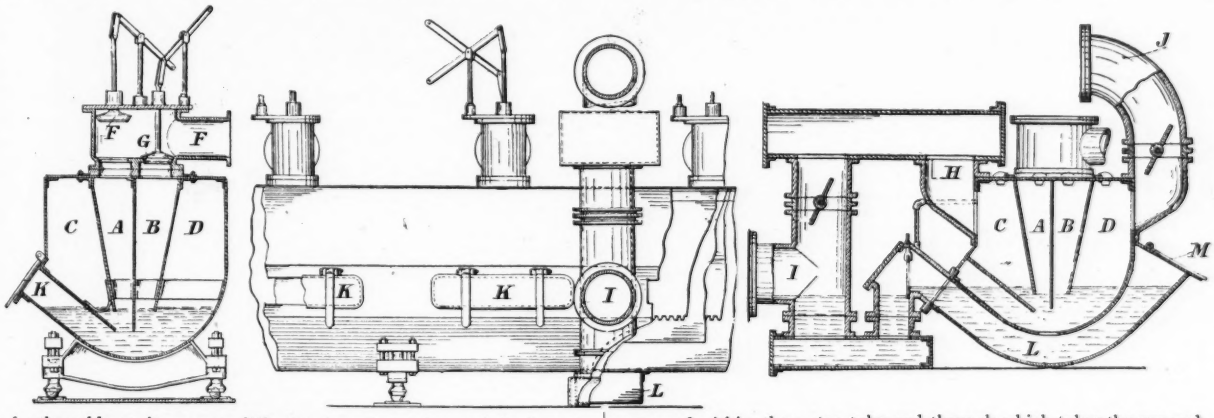
This invention relates to double hydraulic mains; the purpose being "to afford improved means for receiving the gas from the retorts, washing it, and conveying it to a desired point." The arrangement comprises a conduit or main having a plurality of compartments with a common water seal; the compartments adapted to receive the gas discharged from the retorts being centrally located, while on either side are the compartments for receiving the gas through the water seal from the first-named compartments.

The main, as shown, is divided into four compartments A B C D by the partitions which extend throughout the length of the main—the compartments A B being the discharging compartments. The gas discharged from the retort is conveyed through the pipe E to either of the compartments A B, depending upon which valve (F or G) is open. Because of the discharging of the gas into A B, the pressure in these compartments is greater than that in compartments C D. Water is maintained in the main at a height sufficient to immerse the lower edges of the partitions—the cubic partition extending deeper into the water than the others. The lower edges of these latter partitions are also serrated. The result of this formation, and the position of the various compartments, is that the gas bubbles from compartment A, through the water around the lower edge of the left-hand partition, into compartment C; while the gas from compartment B similarly bubbles into the compartment D. The gas is led from compartment C through pipes H I; the suction thereof being controlled by a wing-valve. The gas from compartment D is carried away through the pipe J controlled by a valve.

The tar in the gas is washed out in the water as it passes through the main, in going around several partitions, and is cleaned out at water-sealed ports K.

An advantage of this construction is said to be that there are two complete mains with one set of cleaning ports, and the compartments A and B are of such shape that they keep entirely free of pitch and are easily kept open, so that the gas is maintained at a constant pressure by a constant height of liquor in the compartments C and D.

In single mains as heretofore used, where (the two side partitions being omitted) a compartment corresponding to A and C was used for the hot gas, and a compartment corresponding to B and D was used



for the cold gas, it was very difficult to keep the mains straight, because of the difference in temperature of the two sides. In the construction of the main shown, where the compartments A and B are used for the hot gas, while the flanking or outer compartments C and D receive the cooler gas, the higher temperature is always maintained in the middle of the main, and consequently there is no tendency to twist or distort it. The whole or a portion of the top of the main may be made in a separate piece, and have a sliding engagement with the rest of the main, so as to permit slight movement with respect thereto due to changes in temperature—thus keeping the main entirely straight.

At a convenient point in the main is the chamber L, in communication with the main immediately below the various compartments. Into this chamber a large portion of the tar will flow; being readily cleaned therefrom through the water-sealed port M. The chamber L also has communication through an adjustable apertured plate with the trap chamber communicating with the pipe I. By means of this chamber and its water-sealed connection, it is possible to readily take out the tar and the liquid from the main. The gas may be drawn off independently through pipes J and H.

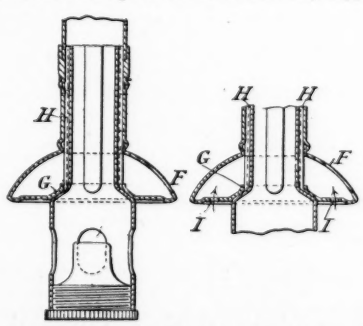
In operation, the main is adapted so that any number of retorts may be connected to compartment A or to compartment B at the same time. "In practice, about half of the retorts are connected to each compartment—a single retort being connected to one compartment for half the time, delivering the rich gas, and to the other compartment for the other half the time, delivering the gas which is poorer in illuminants."

The patentee concludes his specification by an enumeration of a long list of claims—47 in number—extending to more than six closely-printed pages.

Incandescent Gas-Burners.—Alexander, C. J., of Wilson Street, E.C. No. 13,781; June 17, 1904.

This is an improvement on patent No. 3499 of 1903, "whereby increased lighting effect is obtained."

The illustrations show a sectional elevation of a burner of the kind referred to; also one with apertures for an auxiliary supply of air.



The burner-head, the outer telescopic gas and air supply tube connected therewith, and the corrugated inner telescopic gas and air tube arranged within the outer tube and through which tubes the gas and air pass from the nipple and holes respectively to the head to be mixed and burnt, are all of known construction, as described in the former patent. F is the supplementary mixing and heating chamber provided at the lower end of the outer tube, and G is the central opening in the bottom of the chamber which fits the inner tube, which is preferably dome-shaped, also shown.

By this construction, a portion of the gas and air passing through the inner tube, in addition to being mixed and heated in the burner-head, passes down through some of the spaces formed by the corrugations of the inner tube into the chamber G, and returns through some of the spaces back to the head. An additional increment of heat by the contact of the gas and air with the heated inner and outer tubes and walls of the chamber F, and a further mixing of the gas and air, is thus obtained, which, it is said, results in "an intensely hot flame, and consequently a light of very high brilliancy."

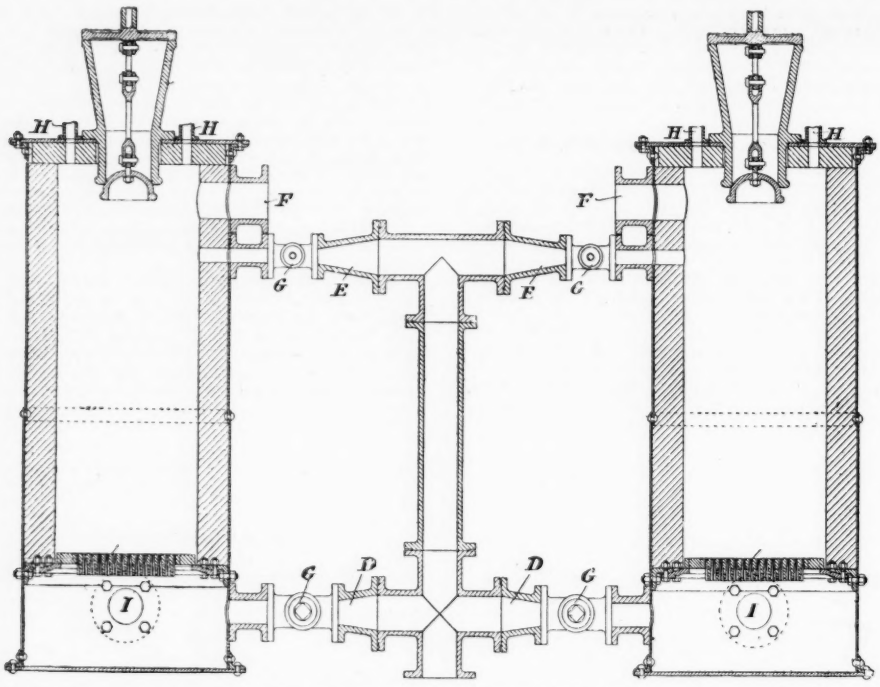
I (in the alternative arrangement) are apertures in the bottom of the chamber F, which can be employed to provide an auxiliary air supply for the gaseous mixture.

Production of Oil Gas.—Rincker, F. G. C., and Wolter, L., of Amsterdam. No. 20,371; Sept. 21, 1904.

The patentees point out that the production of oil gas has hitherto been carried out by spraying the oil to be gasified into red-hot retorts—appliances "not only extremely expensive in themselves, but also require renewal, which adds considerably to working expenses." According to their invention, retorts are entirely dispensed with; and the oil to be vaporized is introduced direct into a layer of incandescent coal after the gases have been burnt out of it. This is said not only to secure a better utilization of the heat of the incandescent coals—in that their heat is not transferred to the walls of the retort but directly utilized instead, but the heat of the gases still present in the coals is also utilized. The gases mingle with the gases produced by the vaporization of the oil and contribute to the improvement of the gas itself; so that what is actually produced is "a mixture of oil gases together with a small quantity of Siemens gases."

In the construction illustrated (p. 852), it is assumed that two generators are used, but several (or even only one) may be employed. Where two are used, one is brought to incandescence while the other is vaporizing. Each generator consists of a cylindrical fire-clay lined furnace provided below with a grate and at the top with a charging hopper. Through the hopper the coals are fed into the furnace up to a certain height and the hopper closed. The mass of coal is then kindled; air being admitted by the pipe D, and afterwards in the usual way by the pipe E also. The products of combustion escape to the chimney by the pipe F. When the coal has burnt up to the desired extent, the cocks G on the pipes D, E, and F are closed; and the oil to be vaporized is admitted by the oil-supply pipe H in the top of the furnace.

In the construction shown, it is supposed that the oil-supply pipe is divided into four branch pipes, which may be conveniently closed and regulated by a cock. The oil introduced from above into the coals (the temperature of which is about 2000° C.) vaporizes as it passes down through the mass of coals, and is finally drawn off through the pipe I. This pipe is in connection with a scrubber provided below with a special chamber for the reception of water and oil residues. The



end of the pipe opens into this water and thereby forms a water seal. The gases, on issuing from the pipe, flow upwards into the scrubber through the wetted purifying material and finally pass away.

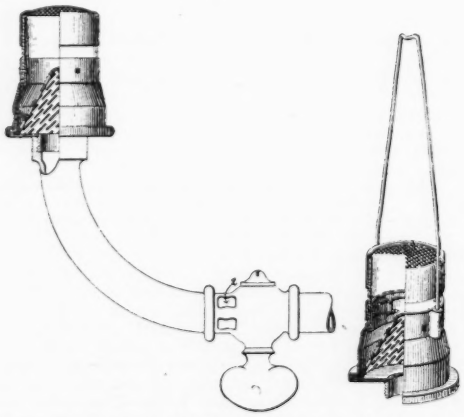
Any cheap material—such as petroleum residues, gas oils, and the like—which will yield a comparatively powerful light and a large heating effect, may be used for vaporization. Experiments which have been carried out so far are said to show that the calorific power and the illuminating power are 5500 calories and 16·2 English candle power respectively. The specific gravity is ·325. It may, however, be taken for granted, say the patentees, that these results could be "considerably improved by careful working."

An analysis of samples of the gases produced from oil gave the following percentage results:—

Carbonic acid	0·2
Heavy hydrocarbons	7·3
Oxygen	1·0
Carbonic oxide	2·5
Methane	15 6
Hydrogen	69 2
Nitrogen	4·2

Incandescent Gas-Lighting Fittings.—Hutchinson, J., of New York. No. 19,677; Sept. 13, 1904.

This invention relates to an "incandescent gas-mantle lighting fixture," having "adjacent means for the admission of gas and air to a horizontally positioned but upwardly curved arm, which serves the combined function of an injector and a mixing-chamber, as well as to support the thermally insulated burner-head, mantle, and globe, or shade."



The illustration shows the fixture with part of the burner-head broken away; also a perspective view in section of a slightly modified construction, in which the parts are provided with a two-arm mantle support.

The gas passing through the cock draws air into the curved arm through the air inlets shown. This arm then performs the function of an injector and of a mixing-chamber for the gas and air. The mixture, after leaving the arm, passes through a strainer into a relatively enlarged space (or expansion chamber) in the burner-head, "which insures the steady and uniform operation of the fixture and prevents 'pumping' or 'beating.'" The perforated outlet plate or cap, being thermally insulated from the lower part of the burner, it is said, "absolutely prevents the high temperature of the flame from being communicated to the fixture arm, which would be otherwise likely to injure the globe or shade supported by the flange, and interfere with the injector action as well as ruin the artistic appearance of the fixture."

APPLICATIONS FOR LETTERS PATENT.

25,841.—Bower, G., "Burners." Nov. 28.
25,844.—Thorn, A., "Gas-mantle." Nov. 28.
25,877.—Neuman, F., and Becker, J., "Manufacture of generator gas, water gas, and the like." Nov. 28.
25,879.—Wilton, G., "Distillation of tar." Nov. 28.
25,912.—Burnham, L. A., "Gas-cooker." Nov. 28.
25,915.—Adams, M. J., "Gas-stoves." Nov. 29.
25,920.—Slack, H., "Gas-boilers." Nov. 29.
25,927.—Pegden, H. F., "Mantle support." Nov. 29.
25 943.—Butterfield, J. B., "Taps" Nov. 29.
25 945.—Hateley, H., "Shadowless pendant." Nov. 29.
25,997.—Neuman, F., "Gas manufacture." Nov. 29.
26,003.—Walters, H. E., "Cocks or valves." Nov. 29.
26,057.—Owensmith, W. H., "Mantles." Nov. 30.
26,074.—Galley, G. T., "Production of gas." Nov. 30.
26,078.—Scheuss, M., "Gasholders." Nov. 30.
26,114—Cashin, A., "Incandescent burners." Dec. 1.
26,178.—Vogt, A., "Producing gas." Dec. 1.
26,197.—Bray, J. W, "Self-intensified lights." Dec. 2.
26,206.—Atkinson, E., "Gas-ovens." Dec. 2.
26,227.—Taylor, F. W., and Wilkes, Limited, "Gas-engines." Dec. 2.
26,244.—Chandler, S., Bell, J. F., and Chandler, J, "Wood grids." Dec. 2.
26,246.—Busse, P., "Manufacture of gas." Dec. 2.
26,266.—Dupoy, J. R., "Prepayment meters." Dec. 2.
26,318.—Smith, W. P., "Anti-vibrators." Dec. 3.
26,373.—Falk, Stadelmann, and Co., Ltd., and Falk, S, "Mantle supports." Dec. 3.
26,385.—Handorff, F. von, "Gas-engines." Dec. 3.

Sale of Stocks and Shares.—At the Mart, Tokenhouse Yard, E.C., on Monday last week, Mr. Alfred Richards placed, by order of the Directors of the South Essex Water Company, a new issue of capital, consisting of £5000 of 5 per cent ordinary stock and a similar nominal amount of 4 per cent. perpetual debenture stock. The former is entitled to 4 per cent. dividend; and it fetched from £100 10s. to £101 2s. 6d. per £100 of stock. The debenture stock realized prices ranging from £106 to £107 5s. per £100.

High-Power Gas Lighting in Southwark.—At the meeting of the Southwark Borough Council last Wednesday, the Works Committee reported, with reference to the decision arrived at on the 9th ult. to convert from incandescent to high-power lighting the public lamps on the southern approach to London Bridge, so as to correspond with those on the bridge itself, that a communication had been received from the Lighting Superintendent of the South Metropolitan Gas Company, suggesting that the system should be extended along the Borough High Street—the Company to lay the necessary mains free of cost, and the Council to reinstate the disturbed pavement. The Committee favoured the extension of the system as far as Southwark Street, which would affect 15 lamps. The Borough Engineer stated that the extra cost per lamp would be about £3 10s. per annum, while the light would be more than trebled. It was resolved to extend the system as suggested by the Committee.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

United Management of Gas Undertakings.

SIR,—I note, with pleasure, that you give the leading position in your "Editorial Notes" of Nov. 8, to a criticism of Mr. Norris's presidential address. The subject is one well worthy of your further attention; and it is to be hoped that some of your readers best qualified to judge, will be heard from in your columns. As one who has had many years of work under "trust" management in a very subordinate capacity, who has extensive knowledge of costs, and quite some experience with the methods and expenses of singly-operated companies, I wish to file a protest against some of the conclusions which you seem to have arrived at.

It is true that none but the largest single plants can afford to maintain departments for analyses, experiment, or research, nor even a construction, draughting, or a purchasing division. The medium-sized and smaller companies are prevented by the item of expense from hiring specialists to conduct their advertising, canvassing, and collecting campaigns. The installation and care of gas-engines is a special field as yet but little cultivated; nor are other industrial uses of gas made the subject of much thought by other than the centrally managed concerns. Even the use of gas for domestic cooking and heating is not looked after by the singly-operated companies with the degree of success achieved by others having the benefits of "parental control." While you liken the corps of experts to Sinbad's Old Man of the Sea for ever upon the local man's shoulders, the facts are that the local man is very generally the burden which the experts are saddled with, and but for whose presence in any certain locality costs could be reduced and sales increased. The local man, more often than not, is a politician of some weight, and should he resign there would be danger of his organizing an opposition company, which would prove both troublesome and costly.

You also speak of the corps of experts standing between and preventing the local man working for himself and coming in direct contact with his employers. In the singly-operated company, the local man's employers are a board of directors composed of the butcher, the baker, and candlestick maker, with a few lawyers thrown in. In the parent-company system, his employers are a managing committee who are all men of brains; and these men devote a large part or all of their time to the interests entrusted to them. The chief engineer, the general manager, and the comptroller are generally part of the committee. Such a board does not expect the impossible from any man; neither do they refuse appropriations for holders, works, or main additions when really needed, nor will they knowingly allow a local man to sacrifice upkeep to the desire to make a good showing in operating.

In order to stimulate enthusiasm in the local man, many centrally operated systems—including electric light, traction, mercantile, insurance and brokerage—hold an annual agents' meeting. The difference between these meetings and association meetings is that attendance is compulsory at the former, discussions on papers to be read are prepared and sent in in advance of the meeting, all desultory discussion is checked, and business is the keynote of all the proceedings. Tables of comparative costs are prepared by the central office, covering every branch of the business. The previous year's figures are also given. Every one in attendance knows who has improved on last year's results, and who has not. Every one knows who does the best, and who does the worst. Every one knows the conditions under which every other one has been working.

The Pennsylvania and the New York Central systems were each originally made up of about a dozen short lines. These separate lines had their full complement of officers—from chairman of the board of directors downwards. Imagine each station agent along such a line conducting his office according to business methods of his own devising. Think what variety there would be with each division superintendent designing the bridges, culverts, turn-tables, and shops for his part of the line. The motto of the parent-company system may be said to be "There can be but one best way of doing a thing." "STANDARD."

Nov. 27, 1904.

[Our correspondent (who does not wish publicity of his name) speaks from the standpoint of American rather than of English experience and practice. He does not picture quite so attractively as did Mr. Norris the relations between experts and the local man, who in this country, even if he be a "politician of some weight," has no chance of giving trouble by organizing an opposition company, when driven to resign from any cause. Nor is he usually "a burden with which experts are saddled, and but for whose presence costs could be reduced and sales increased." The analogy between an amalgamation of "about a dozen short lines" of railway so as to form one system, and the grouping together under one management of (say) a dozen gas-works many miles apart, is not really so complete as our correspondent seems to imagine. We welcome, however, his contribution to the discussion.—ED. J.G.L.]

Improved Arrangement of Carbonizing Plant.

SIR,—Referring to Mr. Graham's letter in your last issue, kindly allow me to reply that no sensible person could think I have taken out a patent in which the claim is for a producer "underneath the charging floor" of an inclined retort-bed.

I have seen the systems mentioned in the letter, and have no doubt the same can be said by your readers, whom Mr. Graham is so anxious to interest. It was when engaged on the West Hartlepool machinery, during my apprenticeship in Aberdeen, that I saw the drawing of the setting, which, as far as my recollection goes, was designed by Mr. George Winstanley. I then thought it desirable that the producer should be mechanically fed with hot coke, but at the time the idea of handling hot material in conveyors was scouted as impossible. It was not until Mr. Hack demonstrated its feasibility that I again took the matter up. One of my claims, therefore, is for the mechanical feeder preferably placed between two beds.

The want of success with the early installations of inclined retorts, due to defective regenerators, led to me making a study of such systems; and the experienced, practical retort-setters whom I fortunately had, suggested, from time to time, improvements which were tried and proved satisfactory, but on the now accepted principle in which the producer is placed under the drawing floor.

Mr. T. B. Ball, of Rochdale, by a chance remark, made it known to me that the generally-accepted theory of long secondary air passages being necessary for successful regeneration, had been proved by him, in practice, to be erroneous. Mr. T. R. Murray, the Works Engineer at Saltley, corroborated this; and I then applied my experience with regenerators, in order to fall in with the views expressed above. The result is a combination of setting with producer under the charging stage, and short, sound, and simple secondary air and waste-gas flues, sectionally controlled. As was pointed out in the article a fortnight since, the setting is one which closely follows the details recommended by such an eminent authority as Mr. J. G. Newbigging.

ARCHD. J. S. B. LITTLE.

Smethwick, Dec. 8, 1904.

SIR,—In your issue of Nov. 29, under the heading "An Improved Arrangement of Carbonizing Plant," we recognize an old friend. An identical arrangement to that shown and described was put up by us at the Huddersfield Gas-Works some years ago, and we believe was the first of the kind erected. The position and circumstances attending this installation required special treatment; and the only way to meet the conditions was to erect settings of the type in question.

We are frequently confronted with so-called patents and special plant connected with gas-works which are very old and have been used by ourselves at one time or another, and many of which are still incorporated in our various structures. Generator and regenerator settings of ten, twelve, and fourteen retorts in each arch are not new, and our firm used such arrangements many years ago. We have also used generators and semi-regenerators since 1868.

WINSTANLEY SPECIALITY COMPANY.

Newton Chambers, Birmingham, Dec. 10, 1904.

The York Mansions Photometrical Tests.

SIR,—With reference to the York Mansions tests, I would like to call your attention to a very significant fact. The electrical central station engineers in London and the surrounding districts have not been content with witnessing the gas and electric tests themselves; in every instance, all their assistants have been brought to York Mansions, and have thoroughly studied the photometrical side of the rivalry between the two methods of lighting.

Further, a very large number of students of electricity have attended from the various educational centres, and have put in hours of work, verifying for themselves the readings of the various instruments, and making themselves thoroughly conversant, not only with the modern methods of testing electric light, but also with the current methods of testing gas for illuminating power, &c.

Now the point I wish to call your attention to is that no gas students or assistants have attended, or so few as not to count. Most of the progressive gas engineers have themselves been; but in scarcely any case have they sent their assistants.

It is probable that not for many years will there be again in England such special conditions for studying photometry; and I trust that in the few days yet remaining, opportunities will be afforded for the attendance of the younger members of the gas profession, who will be the chief engineers of the next decade.

JOHN F. SIMMANCE.

Earl Street, Westminster, Dec. 9, 1904.

The Testing of Burners and Mantles.

SIR,—I was much interested in Mr. Smith's article in the last issue of the "JOURNAL," on the testing of incandescent burners. According to this—if I read the diagram correctly—he gets an efficiency of over 50 candles per foot, at one particular consumption, from an incandescent burner. May I ask what burner this is?

W. G. WERNHAM.

96, Edith Road, West Kensington, Dec. 10, 1904.

Illuminating Power of London Gas.—At the meeting of the London County Council last Tuesday, the Public Control Committee presented a report giving the results of proceedings taken against the Gaslight and Coke and Commercial Companies for supplying gas of deficient illuminating power. The first-named Company incurred two fines of £2 and 22s. costs for gas of 15·41 and 15·35 candle power respectively; and the latter a fine of like amount, with 23s. costs, for a deficiency of 0·61 candle (13·39 against the standard of 14 candles).

Electric Street Lighting at Dudley.—Opinion at Dudley would seem to be very much divided as to the advantages of electric street lighting, judging from remarks made in the Council Chamber from time to time. The latest recommendation of the Committee was that electric lighting should be extended to Hall Street and Dixon's Green; and on this coming before the Council, Mr. F. W. Cook proposed, as an amendment, that it should be struck out of the minutes. He contended that for the illumination of the streets electric arc lamps were not so good as incandescent gas-lamps. Mr. Pargeter seconded the amendment. Mr. E. C. Theedam supported it, and referred to several towns, including Bradford, where there had been extensive developments of electric lighting, but where this method of street illumination had been superseded by incandescent gas-lamps. The Town Clerk said that at the places mentioned the municipal authorities were the owners of the gas-works. The amendment was lost.

LEGAL INTELLIGENCE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Monday, Dec. 5.

(*Before the* MASTER OF THE ROLLS *and Lords Justices* STIRLING *and* MATHEW.)

Metropolitan Water Board v. Westminster City Council—The Reinstatement of Roads.

This was an appeal from a decision of the King's Bench Divisional Court on a special case stated by Mr. Bros, one of the London Magistrates, raising a question as to the charges which local authorities are entitled to make, originally against the Water Companies, and now against the Metropolitan Water Board, in respect of reinstating streets and roads broken up for the purpose of laying or repairing water mains or pipes.*

Mr. DANCKWERTS, K.C., and Mr. COURTHOPE-MUNRO appeared for the appellants; Mr. M'CALL, K.C., and Mr. MORTON SMITH represented the respondents.

Mr. DANCKWERTS said the question here raised, although it only referred to a small amount, was of great importance to the Water Board, and involved some thousands of pounds a year. It was simply whether the City Council, when they elected, under the powers of the Metropolis Management Act, 1855, to reinstate, in lieu of allowing the Water Company to do so, pavements which had been disturbed by the Company's operations, were entitled to charge not only the expense actually incurred in doing the work, but a further sum in the shape of a percentage on that cost under the head of superintendence, as representing the services of the Surveyor and staff of the Council in carrying out their general duties in supervising the operations of the contractors employed. The Council claimed the right to charge for superintendence 10 per cent. on the actual cost of the work. The learned Magistrate had held that the Council were entitled to make a charge for superintendence, but had reserved for further consideration the question of whether it should be 10 per cent. on the cost, or any other sum. After the matter had been decided by the Court whether any such charge could be made, on the case coming before the Lord Chief Justice and Justices Wills and Kennedy, in the Divisional Court, they agreed with the decision of Mr. Bros. From this judgment, the present appeal was brought; the appellants contending that the Surveyor and other employees of the Council were only acting in the performance of their general duty, for which their salaries were paid, in superintending these operations, and that they were not entitled to make any special charge on the Water Company or on the Water Board. Counsel proceeded to read and discuss in detail the various Acts of Parliament bearing on the question—viz., Michael Angelo Taylor's Act of 1817, the New River Company's Act of 1823, the Water-Works Clauses Act of 1847, and the Metropolis Management Act of 1855. He then went on to submit that this supervision must have been exercised by the Local Authority equally if the Water Company had done the work themselves, in which case they could not have claimed the expense.

Mr. COURTHOPE-MUNRO briefly argued on the same lines.

Tuesday, Dec. 6.

On the resumption of the hearing this morning,

Mr. M'CALL submitted, on behalf of the respondents, that the decision of the Magistrate, and of the Divisional Court, was right. He contended that it was a question of fact, and that it had been found by the Magistrate that expense had been incurred in supervising the work done.

The MASTER OF THE ROLLS asked if there was any evidence, or any finding of the Magistrate, that there had been any more expense incurred in supervising this work than would have been involved if the Water Company had done the work themselves.

Mr. M'CALL said he could not say there was, but he thought that probably the Magistrate intended to deal with this point when the matter came before him again to determine the *quantum* of the charge. He submitted that the expense of supervision was a portion of the cost which the Water Company were bound to repay. He again referred to the Metropolis Management Act, 1855, section 114, and argued that the "costs and expenses" there mentioned must refer to the superintendence as well as the actual labour involved. In support of this contention, he referred to Michael Angelo Taylor's Act.

Mr. MORTON SMITH followed, and said the only claim put forward was for the cost of superintendence thrown upon the City Council, which would not have fallen upon them had the Water Company done the work themselves.

Mr. COURTHOPE-MUNRO did not agree with this. He said the claim put forward in the Police Court was as to 10 per cent. on the actual expenditure for supervision.

Lord Justice MATHEW said there did not seem to be any suggestion of this sort on the face of the case.

Some discussion ensued on this point, and in the result

The MASTER OF THE ROLLS said the case must go back to have a direct finding of fact whether there had been any substantial extra expense incurred by the Council owing to their undertaking the work themselves. When this was ascertained, the Court would be in a position to decide on the true construction of the Act of Parliament.

Question as to a Rebate from a Water-Rate.

At the Marylebone County Court last Thursday, before Mr. Fitzroy Cowper, sitting as Deputy-Judge, Mr. James Meadows, licensed victualler, of 30, Bristol Gardens, Paddington, sued the Grand Junction Water Company for the return of £10 odd, said to have been overpaid to them in error. Mr. Poyser appeared for the plaintiff; Mr. Macmorran, K.C., represented the Company. The plaintiff's case was as follows: Between March, 1898, and March, 1904, he had paid to the Company, as water-rate, the sum of £69 6s. Recently, however, he had been informed that, owing to the fact that his premises were upon the Bishop of London's Paddington Estate, he was entitled, under the provisions of the Grand Junction Water-Works Act 1856 (19 and 20 Vict., cap. 116, sec. 4) to a rebate of 15 per cent. This was to be for the benefit of the owners and occupiers, whichever might be liable to pay the rate, of certain premises, including the plaintiff's; and it was this rebate which he sought to recover. The plaintiff was called and gave evidence to the foregoing effect. Mr. Macmorran submitted that the claim must fail, because the payment of the water-rate, as in the present case, was a "voluntary" payment, no part of which was returnable as rebate. As against his friend's reference to the Act of 1856, Mr. Macmorran quoted more recent decisions, to show that the payment of the rate was voluntary, and not subject to such a rebate as that in question. The Judge considered that he was bound by the decisions quoted by the learned Counsel, and gave judgment for the defendants, with costs. He, however, granted the plaintiff leave to appeal. A second action of a similar character, brought by Mr. John Knight, of 32, Bristol Gardens, Paddington, was adjourned, pending the appeal in the first case.

Conviction for Stealing Gas at Oxford.

At the Bullington Petty Sessions on the 3rd inst., James Hedges, corn merchant, residing in Crescent Road, Cowley, was charged by the Oxford Gas Company with stealing a quantity of gas, to the amount of £1, on the 30th of September and other days. Mr. R. Bacon, who prosecuted, said the accused had fallen into arrears with his gas-rent, and his supply was cut off, and the meter removed. A connection had, however, been made (by means of a short piece of rough piping) with the Company's main, and defendant was converting their gas to his own use for the lighting of his house. If the Bench decided to convict, the Directors of the Company wished to leave the matter entirely in their hands. They had felt bound to take the course they had done; as if such practices as those described were allowed to continue, great public danger must ensue. Evidence having been given as to the cutting off of the gas and the pipes being left in safe condition, Mr. A. Brooke, the Chief Clerk of the Company, stated that on the 30th of September he went, in company with Inspector Timms, to the defendant's house, and saw six gas-jets burning. In the place where the meter had been, under the stairs, he found a small connection of lead piping had been made with the main in a most dangerous and haphazard manner, and not by a qualified man. Since the date named the defendant had not been a customer of the Company, and there was no contract between them. He estimated the damage at about £1, which was for 7000 cubic feet of gas. Inspector Timms said he went with the last witness to examine the defendant's premises. The pieces of piping produced were those which had been used by the defendant to connect his pipes with the Company's main. Witness charged him with the theft of the gas, and he replied, "I did not do it; my son, Walter, did." Witness asked if it was with his knowledge; and he replied "Yes." On being formally charged by the Chairman (Colonel Hoole), defendant said he was guilty of knowing the gas was being consumed, but not of stealing it. After deliberation, the Chairman said the Bench were of opinion that defendant was guilty of the charge. There was no doubt that he had practised a very dangerous experiment with the gas; and there was considerable danger that he might have blown up and set fire to his own house or the houses in the immediate neighbourhood. The Bench would inflict a fine of £5, with 18s. costs; or in default one month's imprisonment.

Tampering with Prepayment Meters.

At the Margate Police Court, on Nov. 30, Elizabeth Colnett, a married woman, residing in Princes Street, Margate, was summoned, at the instance of the Isle of Thanet Gas Company, on a charge of wilfully damaging a prepayment gas-meter, on the 22nd ult., to the extent of 3s. 6d., by breaking it open. It was incidentally alleged that the contents of the cash drawer had at the same time been extracted. Defendant pleaded guilty. Mr. T. C. Fuller, the Secretary to the Company, said it was with a great deal of reluctance that they submitted the case to the Bench, but, owing to the large number of prepayment meters which had been wilfully damaged during the past twelve months, they had come to the conclusion that the only course open to them was to take proceedings, in the hope that this would act as a deterrent. The case was an exceedingly clear one. On the night of the 22nd ult., about 12.15 a.m., a constable in the course of his rounds found the detendant's door unfastened, and on making investigations he found the meter had been broken open. The meter was checked on the 14th, and between that date and the 22nd, 300 cubic feet of gas had been registered, equivalent to 10d. worth of gas consumed. Defendant's excuse was that she inadvertently dropped a two-shilling piece into the slot for a penny, and as she wanted to get it out she forced the drawer of the meter. When the constable, however, found the meter damaged, there was no money in the drawer. Evidence was given that the defendant was addicted to drink, and had been convicted for doing damage by smashing windows. Mr. Fuller said his Directors did not press for a heavy penalty; but they wanted to stop this injury to their property and the attendant loss. The defendant was fined 2s. 6d., with 3s. 6d. damages and 8s. costs—14s. in all—with the alternative of going to prison for seven days with hard labour in default of payment. Defendant said she had no money, and therefore had no alternative but to serve the time.

On Saturday week, the Plymouth Magistrates committed to the Quarter Sessions for trial a man named Charles Henry Wright on the charge of breaking open a slot meter and stealing therefrom about 4s. 2d., the money of the Plymouth and Stonehouse Gas Company.

* See "JOURNAL," Vol. LXXXIV., p. 360, and Vol. LXXXVI., p. 453.

MISCELLANEOUS NEWS.

A GAS-WORKS EXPLOSION AT MILL HILL, HENDON.

At the beginning of last week, the daily Press published sensational reports of an explosion which had occurred at the works of the North Middlesex Gas Company, which are situated close to the Mill Hill Station of the Great Northern Railway. As is so often the case, these accounts fortunately proved to be more or less exaggerated—especially with regard to the extent of the damage from a monetary point of view. In one report at least, various stations were said to have been "plunged into darkness," which in reality were not supplied by the Company at all. In spite of this, however, the accident was of a sufficiently serious nature, as will be seen by the two photos on p. 844, which were taken as soon as possible after the occurrence.

Without warning of any kind, on the night of last Sunday week, there was a violent explosion in the meter and governor house, with a simultaneous outbreak of fire. The building itself was practically wrecked; and the station meter, of course, sustained considerable damage, the solder having run from most of the seams in the drum. The valves of both governors in the house also suffered; and a stable at the back of the building was involved. This was the extent of the injury to the works; and about £700 will fully cover it, instead of the "thousands" so glibly spoken of by some of the papers. The accident was caused through the blowing, for some reason or another, of the seal of one of the governors. There were at the time no lights whatever in the meter-house; and the escaping gas must therefore have become ignited by a lamp which was fixed outside. The building was visited at half-past ten (about 20 minutes before the explosion), when everything was found to be right. In order to overcome the fire, it was necessary to shut off the gasholder valves, and so put the district in darkness, because it was impossible to get inside the house to open the bye-passes and close the valves. Every effort was, however made by the Engineer (Mr. L. Trewby) and his staff to render the period of stoppage as short as practicable, with the result that the supply of gas was resumed at 12 o'clock on the following morning. The consumers affected were thus not put to any very great amount of inconvenience through the occurrence; while the inhabitants suffered no damage from the breaking of windows, or anything of that kind. Fortunately no one on the works was hurt, as the accident took place at a time when there were necessarily very few men about.

PROPOSED IMPROVEMENTS AT STOCKPORT GAS-WORKS.

At the Meeting of the Stockport Town Council last Wednesday, Alderman Clarke, in moving the adoption of the minutes of the Gas and Electricity Committee, called special attention to this item: "The Engineer reported that the following matters would require the attention of the Committee in the near future: (1) Acid and sulphate of ammonia plant; (2) stove repairing shop, storing shop, and lamplighters' shed; (3) sidings and railways to works; (4) machine stoking plant. Resolved that, having regard to the fact that the question of mechanical stoking was a matter of extreme urgency, a small Sub-Committee, consisting of the Chairman, Vice-Chairman, and Councillors Brewster and Brown, be formed to visit other towns and the International Gas Exhibition, to examine and report on the various types of mechanical stoking plant now in general use." Proceeding to refer to the question of railway sidings for the gas-works, Alderman Clarke said it was thought some time ago to have a railway running through the Portwood streets to the gas-works. But the new Committee were going to entirely relinquish that idea. It was now proposed to utilize the land which had been bought at Brinnington Rise—somewhere about 7½ acres—and instead of having a railway running through Portwood, it was intended to erect some retort-houses on the new land. In that case they would have practically no use for the Heaton Lane works, except for storage, and would be in a position to sell the front land and so capitalize it. With regard to the fourth item, the machine stoking plant, they found that the consumption of gas was increasing considerably, and they were bound to do something in preparation for the winter of 1905. They could at present only turn out 4,500,000 cubic feet of gas per day, and on the previous Monday week they had to send out 3,800,000 feet; so they had not much margin to go upon. He could assure the Council that the old Committee had left the new one something to go on with. Practically the whole of the retorts on one side of the house were falling in, and something would have to be done at once. There were twelve beds of retorts which wanted relaying; and it was for the new Committee to consider whether they should adopt inclined retorts or machinery. When they decided what should be done in these matters, he should have, of course, to ask Alderman Bell, as Chairman of the Finance Committee, for a loan for the purpose. Referring to the visit of the Sub-Committee to the exhibition in London, Alderman Clarke said they saw there several things which would be advantageous to the gas-works. Mr. Brown seconded the motion. Dr. Marriott said no one who knew the gas-works well, and had been through them, could visit modern works without being ashamed of those at Stockport. There was great need for improvement in the way in which the coal was handled. Alderman Webb remarked that the retorts which were spoken of as being in a tumble-down condition were the first put in, and they had been repaired again and again. Now they wanted taking out entirely and putting on modern lines. Mr. Glithero moved, as an amendment, that the minute with regard to the deputation be not confirmed; and it was seconded by Mr. White. Mr. Brewster opposed the amendment, and said it was ridiculous to ask any man to sanction the purchase of £5000 worth of machinery without first seeing it. Reference had been made at previous meetings to over-officialism, and this charge could be made against the Committee if they left the matter in the hands of officials. They had to deal with this subject more independently, and whatever it cost was money saved to the Corporation. Replying upon the amendment, Alderman Clarke said it was not likely that he would take the responsibility, as Chairman of the Committee, of an expenditure of £5000, £8000, or £10,000 without knowing what he was doing. The amendment was then put and defeated by a large majority. Replying on the discussion to which the presentation of the minutes gave rise, Alderman Clarke said the Council could not expect the deputation to go without incurring some little expense, but it would be as small as possible. The gas-works were built in the wrong place by not being near a railway siding, and a cost for carting was incurred. They intended to save this by building a new retort-house on the land at Brinnington. The Gas Committee was the only earning Committee on the Corporation; and he hoped a good profit would be made, and that at the end of the financial year there would be handed over a considerable sum for the relief of the rates.

The minutes were then passed.

LIVERPOOL AND CARBURETTED WATER GAS.

Deputation to the Board of Trade.

Last Tuesday, a deputation composed of members of the Electric Light and Power Committee of the Liverpool Corporation and the principal officials, waited upon the President of the Board of Trade (Mr. Gerald Balfour), with reference to the supply of carburetted water gas in Liverpool. They were accompanied by the Lord Mayor (Mr. John Lea) and were introduced by Mr. Charles M'Arthur, one of the Members of Parliament for the city. The City Lighting Engineer (Mr. C. R. Bellamy) had prepared a memorandum setting forth the views of the Committee on the subject. The Lord Mayor explained that the object of the visit was to lay before the President their views upon the subject of promoting legislation for the regulation of the supply of carburetted water gas. Communications had already passed between the Board and the Town Clerk (Mr. E. R. Pickmere) on behalf of the Committee, on the subject, and various printed reports had been sent to the Board from time to time, showing the admixture of carburetted water gas with coal gas, and these indicated that in some districts of Liverpool a large quantity of this gas was used. The matter had occupied the attention of the City Council for some years, and they were glad to know that the Home Secretary had appointed a Departmental Committee to inquire into, and report upon, the subject. This Committee, on Jan. 17, 1899, presented a report, and made certain recommendations which, if carried out, would enable the Central Department to regulate the amount of carbonic oxide to be allowed in the public gas supply. A Bill was introduced by the Government into the House of Lords in 1902 to carry out the recommendations of the Committee; but it was not proceeded with, and had not been since reintroduced. The Lord Mayor assured Mr. Gerald Balfour that the City Council considered that having regard to the deadly nature of this gas, if supplied with coal gas in undue quantities, it was most detrimental to the health of the consumers, and might, in case of accident or carelessness, be absolutely fatal. Several fatalities had, in fact, occurred. The question was a national rather than a local one; and he ventured to suggest that it was worthy of the most serious consideration of His Majesty's Government. Other members of the deputation also addressed Mr. Balfour, and questions raised by him were answered by Mr. Bellamy and Dr. Hope, the Medical Officer of Health; information being tendered as to the number of fatalities that had occurred in Liverpool from gas poisoning, and the correspondence that had taken place between the Corporation and the Gas Company on the subject. The President promised to consider the various points brought before him, and communicate with the Home Office thereon.

LANCASTER CORPORATION GAS SUPPLY.

At a recent Meeting of the Lancaster Town Council, the Gas Engineer (Mr. Charles Armitage) submitted his annual comparative statement. It contained the following figures showing the quantity of gas sold and used on the works:—

	1903. Cubic Feet.		1904. Cubic Feet.
Ordinary supplies . . .	48,155,000	..	49,673,900
Prepayment	10,677,830	..	11,967,355
Public and private lamps .	4,228,768	..	4,411,201
Used on works and offices .	387,600	..	493,300
Total	63,449,198	..	66,545,756

There was consequently an increase of 3,096,558 cubic feet, or 4·88 per cent. The revenue for 1903 was £12,435; for 1904 it was £11,506. There was a decrease in the revenue from gas owing to a reduction of 3d. per 1000 cubic feet; bringing the price down to 2s. 3d., with 10 per cent. discount. The cost of the coal and slack, and the wages paid, in 1903, totalled to £6261; in 1904, to £6082—the quantities of these materials used being 6662 tons in the former and 6895 tons in the latter year. Alderman Bowness, in moving the confirmation of the minutes of the Gas Committee, pointed out that the comparative statement showed an increased consumption of gas of nearly 5 per cent. He said it was always a pleasure to make an announcement of this sort, because the Council knew that with an increased consumption there was more profit, and the public reaped the great advantage of gas at a low price. There was, however, a decrease in the amount received for gas. This was expected when the Committee lowered the price in November and July. They had anticipated a decrease of £548 for the half year, but this would be more than covered by a reduction in the cost of production. The lowering of the price had affected the receipts to a further extent of £1443 for the half year; making a total of £1991 given to the consumers in the year. The minutes were passed.

LEEDS GAS WORKERS AND THE UNEMPLOYED.

At the Meeting of the Leeds Corporation on Wednesday, Mr. Ratcliffe, in proposing the adoption of the minutes of the Gas Committee, said he had been asked to explain the minute regarding the reading of a letter from the Gas Workers' Union on the question of the suggestion of the Committee that, in order to find work for the unemployed, the stokers and others should agree to work only six days per week, and, if necessary, one of such days a Sunday. He was sorry to say that, up to the present, no arrangement had been come to; but he had received a communication from the officials of the Union expressing sympathy with the unemployed, but saying that the proposed working alterations would entail great hardships upon the men, and that therefore they could not agree to the suggestions. It had been conveyed to him that the men were open to further negotiations. The Committee had no desire to force upon the men conditions which might be regarded as unreasonable, and were willing to resume negotiations. Alderman Buckle seconded the proposition, expressing the opinion that peaceful negotiations would lead to a settlement, because he believed that both sides were anxious that Sunday labour should be reduced to a minimum.

THE GAS PURCHASE QUESTION AT HESSLE.

A largely attended meeting was held last week at Hessle, the object of which was to enable the ratepayers to become acquainted with the principle of the Bill which the Council intend to promote in the forthcoming session. Mr. T. Appleton, J.P., the Chairman of the Council, presided, and entered into a lengthy explanation of the objects of the measure. He said that the primary cause for the promotion of the Bill was to obtain power to acquire the Hessle Gas Company's undertaking by compulsory arbitration; but as they had to apply to Parliament for these powers, the Council thought they might as well promote an Omnibus Bill, and include two or three other matters of great importance. The Hessle Gas Company were seeking statutory powers which would practically legalize their present position and bind Hessle to them hand and foot for ever. It was a crying shame that Hessle should have to pay 3s. 6d. per 1000 cubic feet for gas, when in the near neighbourhood the charge was only 2s. If Hessle were swallowed up by Hull, once the Gas Company got statutory powers no other company could come into the district. He was given to understand that the paid-up capital of the Company was £5000. According to Act of Parliament, a gas company were not supposed, when a monopoly, to charge more than would enable them to pay a 10 per cent. dividend; but they got over this difficulty by paying bonuses and creating new shares. He was told that the cumulative sum in connection with the Hessle Gas-Works was now £15,000; and that a dividend of 10 per cent. was paid on this amount. If the Company got statutory powers, it would legalize this £15,000 as capital; but if they went in for arbitration now, they would only have to show that the capital was being raised out of the profits of the undertaking and out of the ratepayers. Mr. F. J. Bancroft, of Hull (the Council's Adviser on the scheme), said he considered the Council's proposal was no speculation. If the Company could make £1551 profit in a year, he was confident that the Council would be able to do equally well and probably better. Considerable opposition has been manifested to the Bill by the local Ratepayers' Association.

EXTENSION OF THE WORSBRO' DALE GAS-WORKS.

Inauguration of a Gadd and Mason Holder.

The increase which has taken place of late years in the population of the township of Worsbro', near Barnsley, has necessitated an extension of the works of the Worsbro' Dale and Worsbro' Gas Company, which were established, through the instrumentality of Mr. W. Batty, J.P., the present Chairman of the Company, in 1862. In view of the possibilities of greater usefulness to the district, the Company applied to the Board of Trade for a Provisional Order conferring statutory powers upon them; and it was readily granted last June. The area of supply covers Worsbro' township and Birdwell, having a population of between 10,000 and 11,000. The Order having been obtained, the next step was to acquire land near the existing works for the purpose of carrying out the extensions; and this was followed by the conclusion of a contract with Messrs. Robert Dempster and Sons, Limited, of Elland, for the construction of a tank and gasholder—the latter to be on the Gadd and Mason principle. The work was commenced on the 16th of August, and completed last Thursday. The holder is 70 feet in diameter, and rises 20 feet. Its capacity is 77,000 cubic feet; but it is arranged for telescoping when additional storage room is required. The steel tank is 73 ft. 6 in. diameter and 23 ft. 6 in. deep. The holder was brought into use on Thursday by the turning of gas into it in the presence of a party composed of Directors, officials, and others specially interested in the work. Mr. W. H. Handley (the representative of the Contractors) having formally passed the tank and holder over to the Company, expressing the hope that the supply of gas would increase, Mr. Batty took possession, and said he trusted they would prove sufficient for all the demands made upon them. He then gave an interesting history of the Company, and complimented all the officials on the success of their labours; concluding by turning gas into the holder, which, amid the applause of the spectators, at once began to fill. The company, which included the Secretary and Manager (Mr. Ralph E. Harrison), the Works Manager (Mr. T. Church), and the Clerk of Works (Mr. A. Illingworth), assembled in the Board-room, where toasts suitable to the occasion were duly honoured. A telegram was received from Mr. Broadhead, the Managing-Director of Messrs. Robert Dempster and Sons, who was in London, wishing the Company every success.

STORAGE OF CARBIDE OF CALCIUM.

The Public Control Committee of the London County Council, in the course of a report presented at the meeting of that body last Tuesday, called attention to the issue of an Order in Council, dated Oct. 24, 1904, dealing with the keeping of carbide of calcium. Hitherto more than 5 lbs. of this substance could not lawfully be kept, except in pursuance of a licence under the Petroleum Acts. The new Order increases this quantity to 28 lbs. The undermentioned conditions are to be observed by persons keeping carbide without a licence: (1) The carbide shall be kept only in a metal vessel or vessels hermetically closed at all times when the carbide is not actually being placed in, or withdrawn from, such vessel or vessels. (2) The vessels containing carbide shall be kept in a dry and well-ventilated place. (3) Due precautions shall be taken to prevent unauthorized persons from having access to the carbide. (4) Notice shall be given of such keeping to the local authority, and free access shall be afforded to their duly authorized inspector to inspect the portion of the premises where the carbide is kept and the generator is fixed. Where a generator is used on the premises, there is to be exhibited near it a certificate signed by the maker or supplier that it complies with the regulations as to acetylene generators issued by the Acetylene Association; and full and detailed instructions as to the care and use of the generator are to be kept constantly posted up in such place as to be conveniently referred to by the attendant. The last two conditions are not to apply to lamps for vehicles or other portable lamps. Where the quantity to be kept is limited to 5 lbs. in weight, in vessels containing 1 lb., it is not necessary to notify the County Council (the local authority); and where it is desired to keep more than 28 lbs., or the above conditions cannot be complied with, a licence has to be obtained from the Council.

ASPHYXIATION OF A FRENCH DEPUTY.

A Defective Gas-Stove.

The French Chamber were startled about five o'clock last Thursday afternoon at receiving the news of the death of M. Syveton, a turbulent Nationalist Deputy who was on the eve of being tried for an assault on General André in the Chamber. It appears that after luncheon he entered his study, giving orders that he should be left alone. About four o'clock a servant knocked at the door, and, receiving no answer, went in and found his master apparently dead. A doctor was sent for, but his efforts to restore consciousness were without avail. The room was heated by a gas-stove, which, however, M. Syveton had not lighted either on that or the preceding day; and, according to the first reports, the aperture intended to carry off the fumes of gas was stopped up with a copy of a morning paper, the *Intransigeant*. The Commissary of Police was called in at once; and the body was removed to allow of a *post mortem* examination. This was carried out on Friday morning by Dr. Socquet, in the presence of M. Syveton's doctor and several friends. He came to the conclusion that the Deputy's death was due to "intoxication by oxide of carbon." M. Girard, the explosives expert, and other officials visited the deceased's residence during the morning. Their examination of the gas-stove showed that it was in a very defective condition, and that it was quite possible for anyone to be under the impression that he had turned the tap off, whereas it was still partially open, and allowing gas to escape into the room. Their supposition is that M. Syveton, feeling himself overcome by the gas fumes, got up; but instead of opening the window—an act that would have saved him—bent down to try and close the tap. He was then completely overcome, and fell senseless to the floor. With regard to the newspaper found in the chimney, it is said that this in no way prevented the gas escaping. The experts conclude that M. Syveton probably used the paper to stop the current of cold air which was penetrating into his study. This official inquiry, the results of which are subsequently embodied in a report, takes the place of a Coroner's inquest in France.

ANIMALS SUFFOCATED BY GAS.

On Saturday, the 3rd inst., a camel and a dromedary belonging to a menagerie which was being exhibited at Sunderland, were found suffocated by coal gas. The six camels connected with the show were housed in a shed in a yard, and were left safe on the preceding night. Early on Saturday, the owner of the yard, who resides near the shed, heard a peculiar noise, and with a young man went to see what was the matter. They found the place was full of gas. The meter, which was in another building, was turned off, and when the fumes had sufficiently cleared to allow the owner to enter, he found that five of the animals were lying apparently dead, and the sixth—the youngest of the lot—was standing near a broken window. A closer examination showed that three of the others were still alive. The young one and two which were able to move were got outside, and they revived in the open air. A veterinary surgeon was called in, and, under his attention, the fourth animal slowly came round. The other two, however, were beyond recovery when they were found. The loss to the proprietors is serious; the animals being worth upwards of £200. The escape of gas occurred through the camels knocking down some of the gas-fittings in the shed.

The Omagh Gas-Works Award.—On the proposition of Mr. Codden, seconded by Mr. Clements, the Omagh District Council have decided to rescind the resolution recently passed to traverse the Arbitrator's award in connection with the amount to be paid for the purchase of the gas-works.

BREAKDOWN OF ELECTRICITY AT BRADFORD.

The City In Darkness.

Owing, as is reported, to the fusing of a main subterranean electric cable, the supply of light and power was completely disorganized in a large portion of Bradford on Thursday. According to the accounts in the local papers, a series of explosions in the vicinity of Forster Square heralded the breakdown of the cable. The first of these occurred shortly after eight o'clock in the morning in School Street, where an iron bridge crosses the Midland Railway. The cables are laid immediately beneath the surface of the bridge roadway, and it was at this point that the disturbance arose. There was a sharp report, and immediately a volume of fire and smoke burst through the pavement. So intense was the heat that a large hole was burnt through the bridge. Shortly afterwards there was a similar explosion in front of the Midland Station, opposite Market Street; and this was followed by a disturbance near the end of Canal Road.

Mr. Blackman, the City Electrical Engineer, and Mr. Charles Wood, the Gas Engineer to the Corporation, were soon upon the scene; and it was at once decided to lay bare the cable. With this object, a large number of men were quickly set to work. The most serious explosion was yet to come. About a score of workmen were engaged in the gap in front of the Midland Station, when, without any warning, the onlookers were startled by a loud explosion. There was a wild stampede to escape the shower of *débris* which was hurled into the air, and, happily, no one was seriously injured. The work of uncovering the cables was proceeded with under some danger; and several small explosions took place in which a number of the men were scorched on the hands; for though the current had, of course, been turned off, the cable coverings had become ignited and burnt fiercely. It was not until past midday that the flames and smouldering fires were wholly extinguished. The Gas Engineer spent a rather anxious morning, for in close contiguity to the cables in Canal Road and in front of the Midland Railway Station is the largest gas-main in Bradford—one 28 inches in diameter. At certain points the cables are, in fact, laid over this main, and there was much danger that the fusing might extend to it, with disastrous consequence. Steps were taken to prepare for this emergency; and the gas was as promptly as possible shut off from it. Happily, however, it escaped injury, and the town was supplied through other mains. While the Electrical Engineer had his hands full in Forster Square, a fuse took place in a new set of cables which have been laid in Garnett Street to afford a short link between the generating works and the Leeds Road tramway. This was happily much shorter than the other burn-out; some half-a-dozen yards only being destroyed. Every effort of the staff was directed toward rigging up temporary cables to supply the town. This work, however, proved more difficult than was at first expected; and the whole electrical system was crippled throughout the day. The tramways, having their own cables and feeding links, were able to keep up their service; but almost everywhere throughout the town very great inconvenience was caused by the stoppage of the supply of power. There are 949 motors, according to a recent report of the Electricity Committee. As the great proportion of these motors are usually more or less in use during the day, in not a few cases works were entirely stopped by the absence of current. Some premises had also their own gas and steam engines and dynamos, and were thus independent of the Corporation supply. The publishers of two evening papers in the city were placed in a serious dilemma owing to the failure of power for driving their machinery.

But not less important was the question of lighting. The latest report shows that the incandescent lamps on the Corporation's electricity supply are equivalent to 65,000 lamps of 8-candle power, and the arc lamps to an addition of nearly 10,000 lamps of similar power. The failure of the attempts to restore the service by nightfall brought curious effects in the city. Very many of the shops which have recently been refitted had abandoned their gas-fittings, and relied exclusively on electricity. As a consequence, many of these establishments were compelled to close their doors at nightfall. Others made an attempt to improvise lighting, either by the use of candles or oil-lamps; but the possibilities in this direction were limited. A famine in candles and in lamps speedily ensued, and towards tea-time almost the whole supply of the town seemed to have been bought up. At the General Post Office, many hundreds of candles were used during the evening. Train lamps were utilized at the Great Northern Hotel; and lamps of all kinds were in great demand. The officials at the Town Hall were in the same predicament; and the Streets, Drainage, and Works Committee of the Corporation bravely struggled through an *agenda* which occupied an hour-and-a-half by candle light. The streets, deprived of the light from the shops, were in semi-darkness during the evening. As the breakdown occurred in the morning, the management at the various places of amusement, where electricity is the chief illuminant, were afforded time to make arrangements; and the entertainments were given as usual. The disaster, which will cost not much less than £1000, threw additional demands on the gas supply; and the works were going all day at extra pressure.

It was a significant coincidence that the Bradford Electricity Committee were to have met the same morning to consider a report by the Electrical Engineer upon cable defects in the city. Owing to this occurrence, the meeting had to be adjourned. By about midnight the Electrical Engineer and his staff had succeeded in getting temporary cables fixed, and the current was restored to the Post Office and other buildings. Work was, however, continued throughout the night, and it was expected at an early hour on Friday that the service for power and lighting would be fully restored during the morning.

On Friday the damage had been sufficiently repaired to allow of a supply of current being furnished. The shopkeepers were thus able to put aside their hastily-improvised candelabra and oil-lamps, and enable their shops to assume their natural aspect. It was peculiarly unfortunate that the fuse and the accompanying gas explosions should have taken place in a conduit which conveyed so many cables, and those of such vital importance to the whole system, as were assembled in the one in Forster Square and Canal Road. This conduit contained something like 20 cables; and the full investigation which it was possible to make during the early hours of Friday morning showed that in some cases 300 yards had been rendered useless. In the early hours of Friday morning further cables were got into position, and during the day works and shops which had been in the sorest straits owing to lack of power and light were relieved of their difficulty. The Electricity Committee held a meeting at which the accident was the subject of some discussion; but the time of the Electrical Engineer had been too fully occupied with the work of temporarily repairing the damage and setting the system into operation again for him to have had leisure to prepare an extended report. Interviewed by a Press representative after the meeting, he stated that the whole city was once more fully served. The provision was, of course, only temporary; but it would tide over the difficulty, and in the course of a few days he anticipated that the temporary cables would be replaced by permanent ones. Several weak places on other parts of the system were already known, and, of course, provision was being made for these to have immediate attention.

GAS AND ELECTRIC LIGHTING AT DEVONPORT.

The question of improving the public lighting of the town was discussed at the monthly meeting of the Devonport Town Council last Thursday. In the first place, Mr. J. Mayne moved that the lighting of Marlborough Street—one of the chief business thoroughfares—by electricity should be proceeded with forthwith. He said the street was badly lighted, and that it had been the intention of the Council for years to improve this when the electric cables were laid. All that was required was provision of the pillars and lamps, which would not cost much. The Mayor (Mr. E. Blackall) ruled that the resolution was out of order, as no provision for the cost was made in the estimates. Nothing could be done until the estimates for next year were considered; and in the meantime the matter had better be referred to the Electric Lighting Committee for consideration. This suggestion was adopted.

Mr. E. M. Leest then moved that instructions be given to the Surveyor's Committee to provide in the next estimates for re-lighting the borough with incandescent gas-lamps during the coming year. He said he had previously moved a similar resolution; but it was referred to the Surveyor's Committee, and nothing more heard of it. He did not want the matter again shelved, because the work ought to be carried out as soon as possible.

Mr. H. Banbury, the Chairman of the Electric Lighting Committee, hoped the resolution would be referred to the proper Committee, and that it would be thoroughly considered before the Council decided to adopt incandescent gas lighting. The electric light had just been introduced into the borough; and it was said that Professor Edison was now contemplating the boxing up of the sun's rays for public lighting. (Laughter.) They laughed; but greater things than that had happened. The resolution ought not to be adopted before the estimates were thoroughly considered. He moved, as an amendment, that it be a recommendation to the Committee to make provision for the better lighting of the borough.

Mr. W. Hornbrook, the Chairman of the Gas Committee, agreed that the town ought to be better lighted. No doubt they would have bottled sunshine by and by; but they had not got it yet. At present there was no better light than incandescent gas; and it was about half the price of electricity.

Mr. Leest believed that if incandescent lighting did cost a little more than the present system the ratepayers would pay it readily, because they would get value for their money. Mr. W. J. Waycott said he had consulted with Mr. Banbury, who had agreed that the matter should be brought before the Surveyor's Committee and the Electric Lighting Committee, and that they should present a report. Mr. Leest assented to the suggestion, but said that if the report was not forthcoming at the next meeting of the Council he should again propose his resolution.

Several other points relating to the gas supply were also referred to during the meeting. Mr. J. Goodman voiced the complaint of a number of the ratepayers in the lower part of the town as to the supply of gas. The quality of the gas was now very much worse than when the old Gas Company managed the lighting of the town. The lights now went out frequently; and there was not only danger in this, but people had to pay for large quantities of gas which they never consumed. Mr. R. H. Rendle said it was time the Gas Committee considered their position. They had been in possession of the works for nearly three years; and it was true that the supply of gas was much worse than under the old Company. The question of water-gas plant had been under consideration by the Committee for a very long period; and the Council were entitled to know what was the position of affairs. No private firm could afford to neglect its customers as the Gas Committee did. Mr. Hornbrook said the cause of many of the complaints was the rotten state of the gas-mains. New mains were being laid as quickly as possible; and when they were provided, the supply of gas would be better. As to the water-gas plant, the Committee wanted the best system to be adopted, and the best firm chosen to carry it out. The report on the subject would be presented as soon as possible.

Another question raised was that of the appointment of Messrs. Stevenson and Burstal as Consulting Engineers in regard to the new works which are being carried out at the gas-works. The Town Clerk, in reply, said that Messrs. Stevenson and Burstal were appointed by resolution of the Gas Committee passed on March 3, 1902, confirmed by the Council in the following month, and subsequently ratified under seal of the Council. Mr. W. George called attention to a minute of the Gas Committee stating that a letter had been received from Messrs. Stevenson and Burstal, intimating that the original line of pipes had been deviated from St. Levan Road and taken along College Road. He understood that this had been done without the sanction of the Committee, and that it entailed extra cost; and he thought that those responsible ought to be censured. Mr. Hornbrook said this was only one of a series of complaints. Work had been undertaken without the knowledge of the Chairman or members of the Committee. They were

giving attention to the matter; and he agreed that extra expenditure ought not to be incurred without the Committee being first of all informed of it.

Mr. R. D. Monk, one of the Labour members, complained of his exclusion from the Gas Committee; and in the course of his speech alluded to rumours which were, he said, broadcast in Devonport. Though challenged to say what they were he refused, but asserted that he had received them on the highest authority. Mr. Hornbrook said both the Labour members wished to be on the Gas Committee, but there was only one vacancy, and the name of Mr. Monk's colleague came first. The two Labour members had their full share of the Committee work of the Council.

WEST BROMWICH GAS AND ELECTRICITY SUPPLY.

Purchase of Mines.

At the Meeting of the West Bromwich Town Council last Wednesday, the Gas Committee presented a report in which they referred at length to an action brought by the Corporation against the Mill Farm Colliery Company, Limited, for having, by their workings, caused damage to the gas-works, mains, and other property of the Corporation, and stated that, after securing an injunction, the following terms of settlement had been arranged: The Colliery Company and Thomas and Joseph Marsh are to sell, and the Corporation are to purchase, all the ungotten mines under the Mill Farm Estate adjoining the Corporation property to a distance of 55 yards from the gas-works boundary, being an area of 3 acres or thereabouts, for £3500. A strip of land round the pit shafts, with a right of road thereto, is to be conveyed to the Corporation; but the Colliery Company are to have, during the currency of their lease, the right to use the shafts for drawing coal from the area outside the 55 yards limit. On the purchase being completed, the action to make the injunction final is to be dismissed, the parties paying their own costs. A discussion ensued on the report; and the Committee were congratulated upon the excellent settlement that had been effected, as well as upon the good bargain that had been made. It was pointed out that at the onset of the negotiations, which had been proceeding for some months, the Colliery Company asked £12,000 for the mines. Though the Corporation were now only paying £3500 in settlement of the matter, the mines they were purchasing had recently been valued at nearly £7000. The report was adopted.

The Trouble at the Electricity Works.

At a Meeting of the General Purposes Committee of the Corporation held on Friday week, a report was presented by the Electricity Committee with reference to the complaints made against Alderman S. Pitt (the Chairman of the Electric Lighting and Power Committee) and the foreman fitter, to which reference has been already made in the "JOURNAL." It was stated therein that the memorial received from the men at the electricity works on the subject might be divided under two heads—(1) The Chairman's alleged interference and annoying visits to the works; and (2) the alleged undue preference given by him to certain employees. In reference to the first head, the Committee had to remember that the Electrical Department was a new undertaking, and whatever Chairman had been appointed would have felt it incumbent upon him to pay very close attention to the establishing of so important a branch of municipal work. The Chairman had given an immense amount of time to the development of the undertaking; and they could quite understand that he might have been over-anxious for its financial success. The Committee could further understand that some employees who had worked in stations where it had not been necessary for the Chairman to take so active a part had found his visits not exactly to their taste. However, this difficulty had now been met by the Chairman voluntarily consenting not to make his visits to the works so frequent. The Committee felt that the men had absolute cause for their complaints. With regard to the second head, the Committee had had before them the man who they had reason to believe was the prime mover in the memorial, and he admitted that if he had known all the facts with reference to the appointment of the foreman fitter, he would not have penned the clause in the memorial alleging undue preference; and he thereupon withdrew it, and promised to inform the other men who had signed of what he had done. During the course of the inquiry, the Committee found that many of the complaints were trivial; and it became very apparent that much of the friction was due to the duties of the men not being properly defined. The report was brought up at the meeting of the Council on Wednesday; and it gave rise to a discussion, in the course of which two amendments were proposed—one that the report be referred to a Special Committee of Chairmen, and the other that Alderman Pitt be asked to resign the chairmanship of the Electricity Committee. Neither of them, however, found a seconder; and the report was eventually approved. On Friday night four of the employees of the department handed in their resignations. It is stated that they have been led to take this step on the ground of the unsatisfactory result of the recent inquiry. Of the fourteen employees who signed the original memorial setting forth their grievances, two have already severed their connection with the department.

Gas-Works Fatality at Birmingham.—A fatality at the Windsor Street Gas-Works was the subject of an inquest held in Birmingham last week. It appeared that the deceased, a labourer named Stephen Taylor, got on to the end of a truck, and was handed a bar with which to make a road for the coal to pass through the door of a shoot. While so engaged, however, he apparently overbalanced himself and fell head first through the shoot, fracturing his skull. The Coroner pointed out that there was no eye-witness of the actual fall, so they had to draw the best inferences they could. Deceased was seen on the coal, trying to open a door for the purpose of releasing it, and was next found on the floor below. The Jury returned a verdict of "Accidental death."

COST OF THE LONDON WATER UNDERTAKINGS.

Report by the Special Arbitration Committee of the Metropolitan Water Board.

It may be remembered that at the meeting of the Metropolitan Water Board on the 25th ult., the Chairman (Sir R. Melvill Beachcroft), when referring to the award then recently made in the case of the New River Company, said he hoped the Special Arbitration Committee would be able to present at the next meeting a report on the matters entrusted to them. This was done at the meeting last Friday (the proceedings at which are noticed elsewhere), and we extract therefrom the following particulars.

The final award of the Court of Arbitration in the New River case has practically brought to a conclusion the work performed under the direction of the Special Arbitration Committee; and in these circumstances we think the Board will expect from the Committee a brief report on the proceedings conducted on their behalf during the past 18 months. It is unnecessary for us to say that the work has been one of exceptional magnitude; and we desire to bear testimony to the zeal with which the Counsel, Solicitors, and other expert advisers and witnesses employed by the Board, have carried out the work entrusted to them. We think the Board are greatly indebted to those gentlemen for the success with which the arbitration proceedings have been conducted. When it is realized that the Court of Arbitration sat almost continuously from Oct. 26, 1903, to Feb. 22 of the present year, and that altogether the Court sat for some 60 days, it will be readily understood that the work was one involving the greatest strain on all parties concerned. Especially do we wish, in connection particularly with the New River case, to record the great service rendered by Mr. Haward, the Comptroller of the London County Council, whose evidence given at the last hearing before the Court of Arbitration was of the utmost value.

The awards of the Court having all been delivered and the cases finally disposed of with the exception of the ascertainment of certain costs in the case of the East London, Grand Junction, and Southwark and Vauxhall Companies, we are now able to place before the Board a statement showing the approximate financial result. It must, however, be borne in mind that until various items have been settled, such as the Board's and the New River Company's costs, the costs above mentioned in the case of three of the Companies, the Directors compensation, stamp duty, &c., the total liability placed upon the Board in respect of the transfer of the undertakings cannot be precisely determined. We assume that the Board will desire to receive in due course a report from the Finance Committee on the exact financial position; and no doubt the Committee will report on the subject as soon as practicable. For the moment, however, the present report and the statement appended thereto will, we think, afford some guide to the result which the Board may anticipate from the transfer of the undertakings, excluding any economies which may be brought about by their amalgamation.

The statement appended to this report refers only to the case of the Metropolitan Water Companies; but in order that the whole of the financial position may be precisely determined, it will be necessary to take into account the sums paid to the Tottenham and Enfield Urban District Councils, and also the sums paid by the Croydon and Richmond Corporations, and the diminution of income which will result from the transfer of portions of the Lambeth and Southwark and Vauxhall undertakings to those Corporations. These considerations will not, however, appreciably affect the figures now put forward.

Before proceeding to explain the statement appended to this report, we think it will be convenient to refer to the "Chamberlain's sinking fund." It will be remembered that the operation of the sinking fund clause is explained in the following paragraphs of the report of Lord Llandaff's Commission—

> [Par. 63.] . . . Whenever a Company obtains power to borrow money on debenture stock—and since 1886 no Company has obtained power to increase its capital in any other way—the clause assumes that the money so borrowed earns profit, at the average percentage of the dividend or interest paid on all the capital of the Company, whether share capital or loan capital. The excess of that average percentage over the interest payable on the debenture stock issued, *plus* 1 per cent. for management of such debenture stock, is taken as the profit earned by the new capital; and the Company are required to pay the whole of the excess to the Chamberlain of the City of London, as Trustee, for the purpose of purchasing and holding shares of the Company, and of investing the dividends thereon, with a view to ultimately extinguishing the capital of the Company, or for such other purposes as Parliament may from time to time determine. The effect of the clause is, therefore, to prevent any additional value accruing to the undertaking from the new loan capital, and to withdraw from the otherwise divisible profits of the Company, the sum paid over to the Chamberlain for the benefit of possible purchasers in the future.
>
> [Par. 68.] . . . Whatever differences of opinion may exist as to the policy of Parliament in subjecting the Companies to these clauses, the deliberate intention seems to have been that fresh borrowing powers should be granted to the Companies only on condition that the future profits assumed to result from additional expenditure should be appropriated for the benefit of a purchaser representing the interests of the public.

It will be observed from the statements which we have already made that the question of this fund was the subject of an appeal to the Court of Appeal and subsequently to the House of Lords. In order to facilitate the delivery of their awards the Court of Arbitration, as the Board are aware, delivered their awards in four of the cases in alternative forms—the first on the basis that their judgment with regard to the sinking fund was correct (namely, that the undertakings of the Companies should be valued as subject to, and not free from, the payments to the sinking fund), and the higher figure on the assumption that this decision was wrong.

The difference between the two alternative awards in the four cases in question will indicate the amount which has been saved in the

Statement referred to in the Report of the Special Arbitration Committee.

Company.	Amount of Claim.*	Amount of Award in Cash.	Loan Capital Issued at the Appointed Day.				Income for Year 1903-1904.	Interest paid on Loan Capital in 1903-1904.	Dividends paid on Share Capital in 1903-1904.	Payments to Chamberlain's Sinking Fund in 1903-1904.	Directors' Fees, 1903-1904.
			Debenture Stocks.			Total.					
			Rate of Interest.	Redeemable.	Irredeemable.						
	£	£	Per Cent.	£	£	£	£	£	£	£	£
East London	7,204,144	3,900,000	4½	Free of (Income Tax).	654,740	2,251,166	404,876	75,465	141,221	5,543	3,347
New River	13,260,144	5,967,123†	3	1,596,426							
			4		1,500,000	2,758,000	614,742	86,075	236,308	9,430	11,091
Grand Junction	4,830,000	3,349,500	3	1,258,000							
			4		325,000		249,296	12,928	107,760	..	2,615
			3	75,250		500,250					
West Middlesex	4,200,240	3,524,000	3½	100,000							
			4½		200,000	772,000	298,361	25,830	120,755	10,270	3,776
Lambeth	5,511,342	4,301,000‡	3	572,000							
			4		350,000	1,045,753	325,366	31,212	147,351	9,404	3,451
Southwark and Vauxhall	5,674,140	3,603,000	3	695,753							
			4		1,019,585	2,487,982	294,872	65,545	93,158	2,721	3,162
Chelsea	4,750,000	3,305,700	3	1,468,397							
			4½		175,785		179,260	9,988	105,440	2,134	2,096
			2¾	49,950		249,217					
			3	23,482							
Kent	3,715,614	2,712,000	4½		100,000		220,316	10,747	127,087	1,150	3,000
			5		40,000	333,880§					
			3	151,880							
Staines Reservoirs Joint Committee	..	..	3	1,226,700	..	1,226,700	..	36,105	..	..	..
	49,145,624										
5 per cent. on claims other than New River Company	1,794,274										
Total	50,939,198	30,662,323	..	7,217,838	4,365,110	11,624,948	2,587,089	353,895	1,079,078	40,652	32,538

* Except in the case of the New River Company, each of the Companies claimed in addition a sum equal to 5 per cent. of their claim, or the amount of the Award, for possible loss of interest pending re-investment and for the costs of re-investment. In each of such cases, the Award included a certain amount in respect of this claim.

† The award in the case of the New River Company amounts to £6,534,030 Water Stock; but the figure of £5,967,123 is the cash equivalent, taking as the basis of calculation the price at which the agreement to take stock in lieu of cash was arrived at with the other Companies.

‡ Under the award the Lambeth Company had to pay the Board the sum of £42,678, in respect of the repair of a culvert.

§ This total includes a mortgage of £42,000 at 2¾ per cent.

compensation awarded by the operation of the sinking fund clauses. This difference is as follows:—

East London Company	£400,000
Grand Junction Company	203,000
Lambeth Company	288,000
Southwark and Vauxhall Company	323,000
Total	£1,214,000

Two further points should also be noted—(1) that whereas a part of the profits of the Water Companies was required to be paid to the Chamberlain's fund, the Board will in future be free from any such liability; (2) that the Water Companies' stock held by the Chamberlain of the City of London will be cancelled, so that practically that fund will act as an abatement of the compensation payable by the Board to the Water Companies. This fund will, when all the payments due up to the appointed day have been made, represent approximately a sum of about £200,000 in water stock. As the Board are aware, the sinking fund clause was first introduced into the Companies' Acts in 1886 at the instance of the Metropolitan Board of Works; and the clause has been inserted in various Acts since that date, largely on the representations of that Board's successors, the County Council.

It will be seen from the statement now submitted that the total of the awards in cash would amount, on the basis indicated, to a total sum of £30,662,323. This represents, on the respective bases on which the stock has been issued, £33,564,281 in 3 per cent. water stock. The figure of £33,564,281, however, does not represent the total amount of water stock issued in respect of the transfer of the undertakings, expenditure having to be also taken into account in respect of the following: The costs of the Board and the Companies in the arbitration, stamp duty on vesting, expenses of the Court of Arbitration, expenses of issue of water stock, costs of winding-up not included in the awards, costs of the Bill for the Metropolis Water Act, 1902, and Directors' compensation. Some of these items have not yet been ascertained; but they will probably not exceed in the aggregate the sum of £850,000. If this sum is converted into water stock at the average price at which the recent issue was made, it will represent £917,266 of water stock.

The total amount of water stock issued in respect of the acquisition of the undertakings will thus be as follows:—

Compensation awarded to the Companies	£33,564,281
Other items above referred to	917,266
	£34,481,547
Deduct Chamberlain's sinking fund	200,000
Total	£34,281,547

On this amount of stock (£34,281,547), the annual charge for interest will come to £1,028,446.* In addition to this charge, however, allowance must be made for the annual cost of composition for stamp duty on the stock, and for the cost of management of the stock. These two items represent a sum of about £29,000 a year.

As stated above, we have included in the capital cost of the acquisition of the undertakings a sum in respect of Directors' compensation; but against this it must be borne in mind that the fees formerly paid to the Directors will no longer form an item of expenditure on management. In the year 1903-4, £32,538 was paid to the Directors.

It will be seen from the statement appended to this report that the profit distributed by the Companies as dividend for the year 1903-4 amounted to £1,079,078. This figure, after making allowance for payments to the Chamberlain's sinking fund and to the Directors, will compare with the annual charge to be met by the Board in respect of water stock issued in connection with the transfer. The following may therefore be taken as representing the approximate annual saving to the ratepayers consequent on the acquisition of the water undertaking:—

Profits of the Water Companies in the years 1903-4		£1,079,078
Add payments to the Chamberlain's sinking fund in the same year		40,652
Add Directors' fees		32,538
		£1,152,268
Annual charges to be met by the Board—		
Interest on £34,281,547 of water stock	£1,028,446	
Annual cost of composition for stamp duty on, and management of, the stock	29,000	
		1,057,446
Approximate annual saving		£94,822

It must further be borne in mind that the awards of the Court of Arbitration have been based on anticipations of future additional profits, and that if those expectations are realized the profit which will accrue to the ratepayers will proportionately increase. Substantial economies resulting from amalgamation may also be anticipated. No allowance, however, has been made for payments to sinking or redemption funds for the extinction of the water stock, as the Act provides that, during the first 20 years of the period of 100 years within which water stock issued in consideration for the undertakings of the Companies, or in substitution or in consideration for any debenture stock or mortgage debts, must be discharged, the Board shall not be required to make any payments towards the discharge of such stocks or debts other than the payment of the amount (if any) by which the receipts on revenue account exceed the expenditure in any one year. This is a matter upon which the Finance Committee will no doubt advise the Board in due course.

* It is important to bear in mind that, in accordance with section 4 of the Metropolis water Act, 1902, the Board have taken over the liability of all loan capital (debenture stock, &c.) secured on the undertakings of the Water Companies; that is to say, in addition to the compensation paid to the Companies the Board will have to provide for the interest on such loan capital with a further obligation to redeem the capital which it represents within certain periods. The total of the loan capital taken over on the appointed day amounted to £11,624,948.

The Management of the Cheltenham Electricity Undertaking.—The Cheltenham Town Council have adopted minutes of the Lighting Committee, containing a series of resolutions which disclose an intention of loyally following the recommendations of Mr. Swinburne in regard to the management of the electricity undertaking, excepting in connection with the establishment of a depreciation fund. The inquiry was commented upon recently in "Electric Lighting Memoranda," in which we will take an early opportunity of referring to the discussion on the report by the Town Council.

ELECTRIC LIGHTING COSTS AT BARNSTAPLE.

Some discussion took place at a Meeting of the Barnstaple Town Council on Saturday week with regard to the charges imposed on the rates by the electric light undertaking. The meeting was called to consider the estimates of the rates for the half year ended Ladyday next. A statement as to the financial position of the town was made by the Mayor (Mr. H. Barrett). Mr. S. N. Petter complained that the Council had not had any definite accounts relating to the cost of the electric lighting installation from start to finish, and did not know the balance due at the present time. The Mayor replied that the information was given in the detailed accounts, and could be found there. Mr. Petter said that what he found in the accounts was that the cost of the action in which the Corporation was engaged with Mr. Chanter, the cost of the inquiry, and the charges of the Town Mills, all of which ought to be debited to the electricity account, were put down to the borough fund. The sum of £100 a year was being charged to the account to the benefit of the electric light account, and it was most unfair. The Mayor said Mr. Petter seemed to be talking nonsense. The Council had received £73 profit from the electric light, and the present estimate was that £114 would be received. Mr. Petter seemed to be trying to mix up the electric light account and the borough fund account. Mr. Petter said there were charges in the accounts for the costs of breaking up the streets. The amount for the Gas Company was, he believed, £34 and for the electric light undertaking £26, which was ridiculous, for the streets were disturbed three times on account of the latter compared with once for the Gas Company. The Mayor asked Mr. Petter if he meant to say the Town Council were repaving streets for the electric light, and not putting the cost to the Electric Light Department. Mr. Petter said he did. Mr. Brewer protested against the enormous increase in the expense of public lighting. The estimated cost for the half year ended Ladyday next was £1100. In the six months ended Ladyday last, it was £813. For the year 1903, it was £523; for 1902, £436; for 1901, £504; and for 1900, £591. It was now costing the ratepayers to light the town for half the year more money than it did for the whole year four or five years ago. The only conclusion an impartial observer could come to was that the Electric Light Committee were trying to bolster up the undertaking by charging a large sum to the public lighting account. Mr. Smale said it was a very serious matter indeed that £1400 should have been added to the rates in three years for the cost of lighting. The Mayor said the electric light was not the cause of the increase in the rates. The Council seemed to forget that electric lamps had been put up where there were no lights at all before, and that the streets were much better lighted than formerly. The current at 5d. per unit was the cheapest in the kingdom for a town of similar size. Mr. Lindsley doubted whether they had used the quantity of current for which they were charged. He was never opposed to the electic light, and admitted the lighting was better; but they were paying double the amount for it.

METROPOLITAN WATER BOARD.

The Fortnightly Meeting of the Board was held on Friday, at the offices of the Metropolitan Asylums Board—Sir R. M. BEACHCROFT in the chair.

The Finance Committee reported that they had received a letter, dated Nov. 18, from the Westminster City Council, transmitting the following resolution passed by them in favour of the collection of the water-rates by the Local Authorities: "That, in consequence of the London Water Companies having been reconstituted under a central authority, this Council would urge upon the Metropolitan Water Board the desirability of having its rates levied by precept upon the Local Authorities, and collected in like manner as, and together with, other rates." They had also received a letter, dated the 2nd inst., from the Camberwell Borough Council, stating that they concurred in the resolution passed by the Westminster City Council. The Committee recommended that the two Councils should be informed that the Board would give the subject their attention when considering the provisions of section 15 of the Metropolis Water Act, 1902 ("Expenses of the Board"). The recommendation was adopted.

The Finance Committee also reported on the subject of the rebate of 5 per cent. allowed in the West Middlesex district, which at the previous meeting they had recommended should be continued until the end of the financial year (March 31, 1905), and then stopped. The recommendation was referred back to the Committee, but without any definite instructions. As, however, an amendment proposing to continue the rebate until a uniform scale of charges had been established throughout the whole limits of supply had been rejected, the Committee came to the conclusion that it was the intention of the Board to stop the rebate. They had therefore given instructions for it to be discontinued as from the 25th inst., and for application to be made for the ensuing quarter's water-rate on the basis of the water charges authorized by the West Middlesex Act, 1852. The course taken by the Committee was approved.

The Special Arbitration Committee submitted a long report in regard to the arbitration proceedings. After giving an outline of the principal features, and a short recapitulation of the circumstances attending the case of the New River Company, it was stated that the final award of the Court of Arbitration in that case practically concluded the work performed under the direction of the Committee. The awards of the Court having all been delivered and the cases finally disposed of with the exception of the ascertainment of certain costs in the case of the East London, Grand Junction, and Southwark and Vauxhall Companies, the Committee were able to place before the Board a statement showing the approximate financial result. (This portion of the report is given in full in another part of the "JOURNAL.")

The CHAIRMAN, in moving the adoption of the report, said they were indebted to all the local and other advisers they had employed; and

FOR RELIABLE

VALVES

OF ALL KINDS FOR GAS-WORKS

SEND YOUR ORDERS DIRECT TO

C. & W. WALKER, Ltd.,

MIDLAND IRON WORKS:
Donnington, near Newport, Salop.

LONDON OFFICE:
110, Cannon Street, E.C.

NEW EDITION of VALVE CATALOGUE SENT on APPLICATION.

he testified to the admirable manner in which the Board's Solicitors had conducted the business entrusted to them.

Mr. DICKINSON expressed regret that the Chairman had not commented more on the results of their gigantic transactions. He did not think that London should be satisfied with the results. They had paid roughly £33,000,000 in cash and £11,000,000 for debentures, making a total of some £44,000,000; and the stockholders of the Water Companies, he maintained, had been paid £115 for each £100 of their holdings. That was to say, the shareholders had received more than the value of the property which they sold to the public, and the public had paid something between £2,000,000 and £3,000,000 in excess of that value.

The CHAIRMAN observed that the total result, upon which the Water Board might congratulate themselves, was satisfactory.

The report was adopted.

Other business was transacted, and the Board adjourned until the 20th prox.

BIRMINGHAM WATER SUPPLY.

Quality of the Welsh Water.

When moving the adoption of the report of the Water Department at last Tuesday's meeting of the Birmingham City Council, Alderman Lawley Parker referred to the satisfactory progress being made with the Elan Valley works, and said that they were now having from Wales a little less than half of the first instalment of water, and a little more than half of the actual water consumed at the present time. He pointed out that allusion was made in the report to one of the contracts—namely, that for distributing mains in the city—the final amount of which was £6313 under the original contract. This was the fourth out of ten contracts that had been completed at less than the contract price; but in the case of the others they had not been so fortunate. With regard to the quality of the water from Wales, the Medical Officer of Health had stated that it was entirely satisfactory; and this opinion was confirmed by the Medical Officer of King's Norton. They had had some complaints—not very many considering there were so many thousand consumers—and in every instance they had been referred to the Medical Officer, and followed up by a special inspector. In a few cases, it was found that the solvent quality of the water had brought away something out of the mains; and where this was so, the pipes had been flushed, after which the water was delivered quite pure. The Medical Officer expressed the opinion that most of the complaints had arisen in consequence of the colour of the water, for which people were not prepared. When the water was boiled, it was found that there was not one-tenth of the sediment that there was in boiling water from the old sources of supply. Those who were interested in boilers would take some comfort from this fact, because they knew how the sediment from hard water affected the boilers, and how difficult it was to remove. The department was now supplying the Welsh water to the whole of the high and middle levels. The low level would receive it later, and by degrees, as the new filter-beds in the Elan Valley were finished.

Referring to the scheme for dealing with the old pumping-stations, Alderman Parker said he might supplement what was contained in the report by explaining that their first proposal was to permanently abandon all the least pure sources of supply—namely, the River Blythe, Perry Stream, and Perry Well. Then there was a second group of stations which it was not economical to continue working. To these belonged the Perry sinking, of which they took a seven years' lease from General Calthorpe in order to obtain a temporary supply. The period of that lease would expire next year. It was an expensive source; and they did not need it. They also included in this group King's Vale Well, which had never been productive of much water. The Aston pumping-station was to be abandoned because there was no longer need for it; the Welsh water being distributed by gravitation. They therefore proposed to remove the boilers and some engines at Aston to the stations which they intended to retain. These formed the next group, which would be kept as a stand-by with which to meet emergencies, such as the extra demand in times of drought or of frost. The aim of the Committee was to delay constructing the third line of pipes from the Elan Valley until the normal demand required it. In other words, they could tide over the maximum demand owing to drought or frost by means of the stand-by; but when the normal average demand exceeded 25 million gallons per day, the third pipe would have to be laid. As this third pipe meant an expenditure of half-a-million sterling, it would be seen at once that it was desirable to save interest and sinking fund as long as possible. The stand-by stations would be at Whitacre, Plants Brook, Short Heath, Aston Well, Selly Oak, and Longbridge. From these sources there would be 14 or 15 million gallons of water per day to supplement the Elan supply when needed. Then the Monument Road pumping-station was to be retained and enlarged, because it would be required to deliver the Welsh supply to the higher districts, and would also be useful to distribute water from the stand-by supply.

The report was adopted.

TEIGNMOUTH WATER SUPPLY.

Alternative Pipe-Lines for a Supply from Paignton.

The Surveyor to the Teignmouth Urban District Council (Mr. C. F. Gettings) presented to that body last Tuesday a report on the subject of alternative routes for laying the main to bring in a supply of water from the new works of the Paignton Urban District Council on Dartmoor. The route originally suggested was *viâ* Highweek, Teignbridge,

POWERFUL AND PURE HEAT

WITHOUT SMOKE OR SMELL.

CLARK'S PATENT HYGIENIC

"SYPHON" STOVES.

DO NOT FAIL TO VISIT

OUR STAND No. 37,

At the International Gas Exhibition, Earl's Court, W., Nov. 19 to Dec. 17.

S. CLARK & CO., Patentees & Makers, Compton Works, Canonbury Road, Highbury, London, N.
Show-Rooms:
58, Holborn Viaduct, E.C.

Kingsteignton, and Bishopsteignton to the Hazeldown reservoir. This, however, presented such serious obstacles that he had considered the alternative routes, and gave details of four. The length and cost of these alternative routes he estimated as follows: No. 1 (11 miles), £23,081; No. 2 (9¾ miles), £21,401; No. 3 (11½ miles), £23,017; and No. 4 (10⅝ miles), £21,150. On route No. 1 a great portion of the excavation would be through rock, and another section through land undermined by clay workings and constantly sinking. The latter was so serious an obstacle that Mr. Gettings doubted whether the Local Government Board would sanction a loan for the works. Route No. 2 would follow the county main road; and the objection to it was that for about 1¼ miles it ran through Newton Abbot, and would no doubt be strongly opposed by the District Council of that town. From the engineering standpoint, route No. 3 was comparatively easy, except for the drawback that it also passed through the land under which there were old clay workings. Route No. 4 was, however, the cheapest; and, taking all things into consideration, he strongly recommended the Council to adopt it. The pipes would connect with the Paignton main at Windthorn Cross, and run by way of North Wilborough, Kingskerswell, Coffinswell, Haccombe, Netherton, Ware, and Bishopsteignton, to the Teignmouth reservoirs. He proposed to cross the River Teign by an inverted syphon. This was the chief difficulty on this route. But it was not an insurmountable obstacle; and by using this route Shaldon could be supplied without incurring the expense of laying a main across Shaldon Bridge. The main would pass through villages having a population of about 1200, which could be supplied. Considerable discussion took place as to which of the routes should be adopted. Some of the members thought that the permission of Newton Abbot might be asked, with a view to the use of the route through that town. Others were in favour of adopting the Surveyor's proposal. Another suggestion was that a water engineer should be consulted especially on the question of the means of crossing the river. Mr. Alsop, supporting this view, said the estimate of the cost had gone up from £13,000 by their late Surveyor to £23,000 for either of the two alternative schemes. In the end, further discussion of the matter was adjourned.

BARNSLEY AND THE MIDHOPE WATER SCHEME.

A Local Government Board inquiry was held a fortnight since at Barnsley, by Mr. F. H. Tulloch, into an application by the Corporation to borrow £60,011, for the purpose of completing the Midhope reservoir, upon which £298,601 has been already expended. The Town Clerk, in narrating the history of the reservoir, said that the first estimate in 1895 was that the work would cost £170,000. In 1901, however, a supplementary estimate of £120,000 was submitted, and £113,422 was loaned. For the reservoir itself, which was now nearing completion, it was estimated by Mr. Chas. Hawksley, the Consulting Engineer, that £19,339 would still be required; while Barnsley, in the original Act, agreed to pay Sheffield the sum of £27,426, and the cost of the Act was £15,179. The items of £170,000, £113,422, and £15,179 made a total of £298,601, which, deducted from £358,612, the amount required, left the sum now wanted. Evidence was given by Mr. Hawksley, who explained that the present loan was sought for because the work had cost, since 1902, more than he estimated it would. There had been some trouble with the filter-beds; and there were one or two items now included which were not stipulated for in the previous estimate. The Town Clerk pressed that the amount should be loaned for repayment within sixty years; urging that the burden on the town, on account of the money having to be repaid in thirty years (which was the time stipulated for the second loan), was very considerable. In reply to the Inspector, Mr. Hawksley said he took the full responsibility of advising the Corporation in respect to doing the work by administration.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Gas Committee of the Dundee Town Council have had prepared by Mr. A. Yuill, their Engineer and Manager, a sort of Christmas card, in the shape of an illustrated booklet, giving a description of the Corporation gas-works. The *brochure*, it is said, affords an admirable insight into the arrangements and processes followed in the works. It is profusely illustrated, and contains an excellent ground plan of the establishment. The descriptive letterpress, though written by an expert, is not of such a technical nature as to be difficult to understand by anyone who may take an interest in the matters dealt with. To the general reader, it is surmised the work will prove to be very useful.

A couple of manufacturers in Dundee were prosecuted in the Police Court yesterday on charges of having permitted black smoke to issue from their works. In the first case, in support of a plea of not guilty, a solicitor stated, as a special defence, that the coke which was used by the firm was supplied from the Corporation gas-works, and was not of the quality which had been contracted for, in respect that it was mixed with sand, and that it was in consequence of this circumstance that excessive smoke was emitted. The case was continued for trial. The second case went to trial, when it was found that the case for the prosecution depended upon the evidence of watchers employed by the Corporation. One of the partners of the accused firm stated in evidence that he and the members of his family had been manufacturers in Dundee for over half-a-century, and this was the first occasion they had had any complaint. They had, he said, been at great expense in order to provide the most up-to-date appliances for the consumption of smoke; and he taunted the prosecution with their inability to see the volumes of black smoke which belch forth from the Corporation

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily
BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000	TONBRIDGE	300,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	STRETFORD	500,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	OLDBURY	300,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	TODMORDEN	500,000
BIRKENHEAD	2,250,000	ST. CATHERINES (2nd Cont.)	250,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	YORK (Second Contract)	750,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	ROCHESTER (Second Contract)	500,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	NEWPORT (MON.)	250,000
HALIFAX	1,000,000	YORK	750,000	TOKIO, JAPAN	1,000,000
TORONTO	250,000	ROCHESTER	500,000	PERNAMBUCO (Brazil)	125,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	MALTON	150,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	DULUTH, MINN. (2nd Cont.)	300,000
MONTREAL	500,000	DULUTH, MINN.	300,000	BROCKVILLE (ONT.)	250,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	SMETHWICK	500,000
BELLEVILLE	250,000	LEICESTER	2,000,000	GRAVESEND	300,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	NEWPORT MON. (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	TORONTO (Third Contract)	750,000
		BURNLEY	1,500,000	TORONTO (Fourth Contract)	1,000,000
		KINGSTON-ON-THAMES	1,750,000	MONTREAL, ONT. (2nd Cont.)	1,800,000
		ACCRINGTON	500,000	HAMILTON, ONT.	400,000

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.

AND, IN ADDITION, 5,300,000 CUBIC FEET DAILY; also Coal-Gas Plants at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

electric power station. The Magistrate acquitted the firm, but inflicted a penalty of 10s. upon the fireman who was responsible for the creation of the smoke. The plea put forward in this instance is one which corporations cannot ignore. It is the one consideration which prevents the Corporation of Glasgow from taking proceedings against manufacturers for emitting smoke in the city.

The Dumfries Town Council have succeeded in getting a deduction upon the valuation of their gas and water pipes for parish council assessments. The scheme of assessment which has been followed has been to allow 10 per cent. off the valuation of various classes of property, including the pipes; but this was altered by increasing the amount of the deduction in respect of lands and houses to 15 per cent. The Corporation asked that the deduction upon the valuation of the gas and water pipes should be altered to the same figure. In support of the appeal, it was urged that the cost of repairs upon pipes should be allowed. This would probably amount to 30 per cent. of the annual outlay upon them; but the Corporation only asked an allowance of 15 per cent. The Parish Council granted the extra reduction. This was reported to the Town Council in the end of last week. The Town Clerk also stated that the Treasurer had laid before him papers connected with the income-tax assessment, in order that he might consider the question of a further deduction from profits under Schedule D, on the ground of depreciation. The sum at present allowed is £196. He had not yet adjusted the figure that would be claimed; but meantime he had lodged an appeal to the Special Commissioners of Inland Revenue. The Council approved of the action of the Town Clerk. They also agreed that a deputation of five of their own number, with the Town Clerk and Gas Manager, should visit the International Gas Exhibition in London.

In connection with the adoption of the Burghs Gas Supply Acts in Monifieth, mentioned four weeks ago, the information is now given that twenty ratepayers have lodged with the Town Clerk a remonstrance against the proposed transfer of the gas undertaking. There will, consequently, be a poll of the electors in the burgh.

It is reported from Dundee that there is a great scarcity of pennies in the city. One of the reasons for the shortage is that the prepayment gas-meter requires a much larger stock to be held than formerly. There has been a great increase in these meters in the city—the numbers rising since April last from 6858 to 8122. In the past year, the revenue from these meters amounted to £6596. The coins are collected every two months; and as each meter has, on an average, a capacity for 300 pennies, it is estimated that there is a quarter-of-a-million coins continuously locked up.

In the Edinburgh Town Council on Tuesday, the Electric Lighting Committee asked authority to make application to the Secretary for Scotland for power to borrow an additional sum of £90,000 for the electric light undertaking. They had, the Convener of the Committee stated, power to borrow £860,000, and their outlay, up to the present time, had amounted to £845,336. Their estimated capital expenditure for the current year was £60,820. The sum to be borrowed would, he anticipated, carry them on for probably the next two years. The accounts for the past year showed remarkable progress all along the line. The output of current had increased by 1½ million units; being the largest increase under each head since the undertaking was begun. Along with this remarkable increase of business, there had been effected a still further reduction in the cost of production, which now stood at the very low figure of 0·89d. per unit—the lowest record of any municipal undertaking of the kind in the kingdom. The Council granted the power asked.

At the Montrose Town Council on Monday, a communication was submitted from the Local Government Board, with reference to the water supply of the burgh. It was pointed out that there had been scarcity of water in July, 1898, September, 1899, and July and December, 1901, and that after the last experience it had been resolved to extend the adit in the water-works with a view to increasing the water supply. This extension was not completed until June, 1903. The Board wished to know whether, since that date, there had been any scarcity of water experienced, and, if so, what measures were taken to procure a supplementary supply. The Council remitted the subject to the Water Committee.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Dec.* 10.

Sulphate of Ammonia.

The tone of the market has been quieter; but parcels out for tender have been disposed of at last week's prices, and quotations remain £12 16s. 3d. per ton f.o.b. Hull, £12 18s. 9d. per ton f.o.b. Liverpool, and £13 1s. 3d. per ton f.o.b. Leith. Consumers abroad have scarcely come into line with the recent advance; while operators with December contracts to cover, having the month before them, though willing to pay current prices, are anxious to avoid a further advance which might be caused by undue haste in purchasing. November shipments show an increase of over 2000 tons upon those for November, 1903. The forward position has attracted less attention, the advanced ideas of makers precluding further business at present.

Nitrate of Soda.

This article, though weaker in Germany, is firm on spot, and the quotations remain 11s. and 11s. 3d. per cwt., for ordinary and refined qualities respectively.

LONDON, *Dec.* 10.

Tar Products.

Markets have been steady during the past week; but there does not appear to be very much business doing. In benzol, sales are reported in 90 per cent. in London at 10½d. for early shipment; but as regards

THE
MAXIM PATENT CARBURETTOR
FOR ENRICHING GAS IN BULK.
PREVENTS NAPHTHALENE DEPOSITS.
OVER 120 MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.
Among the Companies and Towns supplied are The Gaslight and Coke Company, The South Metropolitan Gas Company, Birmingham, Leeds, Rochdale, Bristol, Sheffield, Oldham, Dundee, Perth, Dunfermline, and many other Works, both large and small, where they have been working in some instances for the past Ten Years.
MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c
THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.
The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.
Dealers in Benzol, Carburine, and all other Naphthas and Oils suitable for the Enrichment or Production of Gas.
For Prices and full Particulars, apply to
THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED
18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

the North, buyers are not disposed to pay this figure. 50-90 per cent. is quiet, and there is no business of importance to report; while there are still sellers at 8½d. for December shipment. A small quantity of toluol is reported to have been placed at 7½d. London for home consumption. In solvent, the position remains unchanged. There is a fairly good business doing for all over next year in the London district for home consumption; but there is not at present very much inquiry from the Continent. Makers generally report rather a better inquiry for the heavier qualities, for which the consumption appears to be increasing, especially in the London district. There is no business whatever doing in anthracene, as consumers appear perfectly indifferent as to the market just at present; while makers will not consider forward business at the low prices which are mentioned for "A" quality. As regards "B" quality, this is still unsaleable. Fortunately, however, scarcely any will be produced next year. The demand continues very strong in carbolic acid, especially for December-January delivery, for which there is a good inquiry all round. Business is reported in 60's at 2s. 4d. for prompt; while for January-June next year, business has been done at 2s. 3d. In crystals, the price remains about the same; but there is certainly a strong inquiry, and German makers are reported to have raised their quotations during the past week. In creosote, London prices are well maintained; and it is reported that further orders have been sent to this market for export. In the North, makers still ask 1⅜d., which price, however, consumers decline to pay for either prompt or forward delivery. Pitch continues steady, and there appears to be a fairly good inquiry over the first six months of next year. London makers still ask 38s. to 38s. 6d., which prices, however, consumers are not at present prepared to pay.

The average values during the week were: Tar, 18s. 6d. to 22s. Pitch, London, 37s. 6d. to 38s.; east coast, 35s. to 35s. 6d.; west coast, 33s. 6d. to 35s. **Benzol, 90 per cent.**, 10½d.; **50-90 per cent.**, 8½d. **Toluol**, 7½d. **Crude naphtha**, 3¼d.; **solvent naphtha**, 8⅝d. to 9½d.; **heavy naphtha**, 10d. **Creosote, London**, 1⅝d.; North, 1¼d. to 1⅜d. **Heavy oils**, 2⅛d. to 2¼d. **Carbolic acid, 60 per cent.**, 2s. 3d. to 2s. 4d. **Refined naphthalene**, £4 to £9; salts, 20s. to 21s. 6d. **Anthracene**, "A" quality, 1½d. to 1⅝d.; "B" quality, unsaleable.

Sulphate of Ammonia.

The market continues steady, and there is still a good inquiry for forward delivery, although for prompt the demand is perhaps not quite so strong. The Gaslight and Coke Company are not at all anxious to sell, but the nominal quotation is £13 10s. for January-June. The South Metropolitan Company are reported to be asking £13 10s. for December-January, on their own terms, which is a rather higher price than buyers are disposed to pay. Sales were made in Hull at £12 17s. 6d. to £12 18s. 9d.; while for January, the price may be taken as £13. In Leith, further business is reported at £13 and £13 2s. 6d. for December shipment, and there appears to be still a very strong inquiry for January-June.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The demand for all classes of coal since our last issue has been very steady. House-fire descriptions do not leave the pits to the extent anticipated a week or ten days ago; but engine fuel maintains a strong position, and some local colliery proprietors have secured an advance of 3d. per ton on the renewal of contracts. From some quarters it is said that the rise has exceeded this amount. Still, there has been no official rise in prices. There is an undoubted upward movement in the iron trade, and this, coupled with full time in the cotton trade, must have a beneficial effect on the collieries. The quotations are: Best house coal 13s. to 14s. per ton at the pit, seconds 11s. to 12s., common 9s. to 10s., steam and forge coal 8s. 6d. to 9s., secondary 8s. to 8s. 3d., best slack 8s. to 8s. 6d., secondary 7s. 6d. to 7s. 9d., lower qualities 4s. 6d. to 5s.

Northern Coal Trade.

There has been a rather more irregular demand for coal. For steam coal rather less inquiry has shown itself, and some of the collieries have had an occasional idle day. Best Northumbrian steams are 9s. per ton f.o.b, second-class steams from 8s. to 8s. 3d., and steam smalls from 4s. 3d. to 4s. 9d.—the latter kind being rather scarce. In the gas coal trade, the demand is now at its fullest, and the best collieries have their output fully taken up by contracts. The prices range from about 7s. 9d. to 8s. 3d. per ton f.o.b.; and at between these prices it is said that one or two collieries have entered into contracts for a long date for one of the French ports. In the coke trade, there is a firmer tone at higher prices; but gas coke is now very plentiful. More gas coke is being sold for household use at some of the inland centres; but stocks seem to be rather heavy at present.

Scotch Coal Trade.

There is no change in the market. There is a strong demand, mostly under contract, which does not affect current rates. The prices quoted are: Main 7s. 6d. to 7s. 9d. per ton, f.o.b. Glasgow, ell 8s. 3d. to 9s. 3d., and splint 8s. 9d. to 9s. The shipments for the week amounted to 257,628 tons—an increase of 40,212 tons upon the previous week, and of 57,013 tons upon the corresponding week of last year. For the year to date, the total shipments have been 10,876,938 tons—an increase of 395,364 tons upon the corresponding period.

Incandescent Burners for Street Lighting in Birmingham.—The Birmingham Public Works Committee have decided to increase from 6000 to 8000 the number of incandescent gas-lamps in use in the streets. When this has been done, there will be left only about 2000 of the ordinary fishtail burners. It has been found that the life of a mantle is about 500 hours, while each lamp burns on an average 3800 hours a year.

Our Exhibit

Earl's Court.

TRADE NOTES.

The De Brouwer-Jenkins "Economical Retort-House."

We are asked by Messrs. W. J. Jenkins and Co., Limited, to state that, since the publication of our article on the De Brouwer-Jenkins plan of economical retort-house construction in the "JOURNAL" for Nov. 29, they have received information that an automatic cut-off arrangement for regulating the supply of quenching water to the De Brouwer patent coke-conveyors has been used for a long time by Mr. Henry Hack on the De Brouwer coke-conveyors installed in the inclined retort-house at the Nechells Gas-Works, Birmingham. The arrangement is due to Mr. J. Hewitt, the Chief Draughtsman to Mr. Hack. The idea from which Messrs. Jenkins worked came to them from observation of an arrangement introduced at the Shoreditch Gas-Works of the Gaslight and Coke Company by one of the officials at that station.

West's Retort-House Plant.

The Croydon Gas Company have just placed contracts with West's Gas Improvement Company, Limited, for the whole of the work included in fourteen main arches, chimneys, and the entire constructional steelwork comprised in the buckstays, tie-rods, and floor-girders, all to the designs prepared by Mr. James W. Helps, the Company's Engineer and General Manager; also for the work comprised in fourteen through regenerator settings of eights. These settings are to be provided with one producer for the through bench, and will be built with West's special arrangement of waste gas and secondary air flues. These new arches and settings are an extension of the No. 3 retort-house at the Croydon works, which, with this addition, will contain 29 settings of eights, the whole of which will eventually be operated by West's compressed air stoking machinery already installed.

The Redman Patents.

Mr. Thomas Redman, of Bradford, desires to make an explanation. He writes: We have been asked several times why we did not exhibit at the International Gas Exhibition. I beg to say that we were unable to get our models ready in time for this to be done; but we hoped to be near the exhibition on the closing days with the completed models. However, we found there was no accommodation suitable for us in the vicinity, but have now secured rooms at the Midland Grand Hotel, St. Pancras. Mr. Redman adds: We did not expect our advertisement to create inquiry from abroad, but such is the case, which clearly shows that our foreign competitors are quite alive to adopt new ideas which may lead to advancement.

Ammonia Stills at the Gas Exhibition.

Mr. George Pettigrew writes (under date of Friday last): Referring to Messrs. Biggs, Wall, and Co.'s letter in your last issue, I have to thank them for their offer to provide space to exhibit my loose tray for ammonia stills alongside theirs, for the purpose of comparison. I do not think this is necessary, as my type of tray is well known. My firm had the offer of space like others; and had we been desirous of showing our ammonia stills with my loose trays at the exhibition, we could have done so in the usual way. There is no doubt whatever (as stated in my previous letter) that the improvements in ammonia stills claimed by Messrs. Biggs, Wall, and Co. are mine.

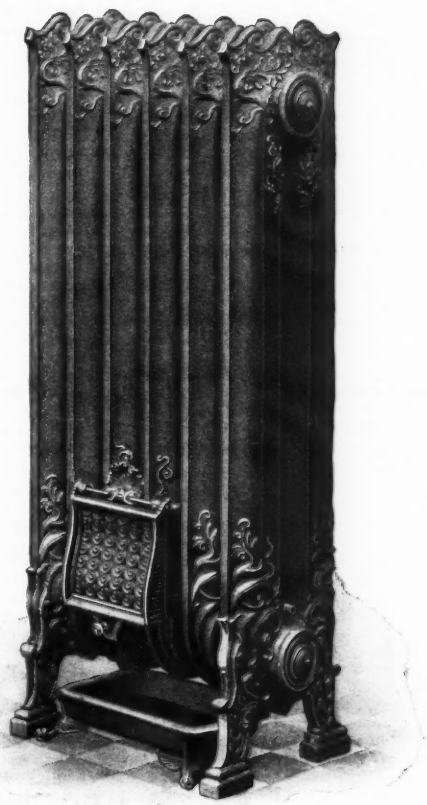
Diaries and Pocket Books for Next Year.

Among the diaries and pocket books for the ensuing year which are now reaching us, one of the latter which is being sent out by the Cowan Branch of Messrs. Parkinson and W. & B. Cowan, Limited, may be specially mentioned for the excellence of its get-up. It contains a price list, with dimensions and measuring capacity, of their wet and dry gas-meters, followed by a telegraphic code for ordering them; and there is a useful table showing the price of gas per 1000 cubic feet at varying quantities per penny and shilling for prepayment meters. The diary portion gives a week in an opening; and the rest of the book is arranged for addresses, notes and memoranda, and bill and cash transactions. It is neatly bound, and furnished with a pencil in the back.

The Price of Gas to Prepayment Consumers at Dukinfield.—At the meeting of the Dukinfield Town Council on Monday last week, the resolution passed at the ratepayers' meeting held on the 7th ult., to the effect that the prices now charged for gas in the town require revision, and recommending a reduction of 4d. per 1000 cubic feet to the penny-in-the-slot consumers (*ante*, p. 484), came before the members in a letter which was read by the Clerk. Alderman Pratt moved that the matter be referred to the Gas Committee for their serious consideration; and the motion was carried by a large majority.

The Gas-Tank Explosion in Chicago.—In the "JOURNAL" for the 22nd ult., we reported, on the authority of telegrams which reached England from various sources, a disaster which was stated to have occurred at the works of the People's Gas Company in Chicago. As might have been expected, the reports were all wrong, as shown by the following paragraph from the last number of the "American Gaslight Journal" to hand: "Those who read the evening newspapers of the 17th inst. [Nov.] must have believed for five minutes or so that the entire plant of the People's Gaslight and Coke Company of Chicago had been destroyed by an explosion. There was an explosion on the date mentioned, but it was in the storage plant of the Pyle National Electric Headlight Company, the yards of which are located at 74th Street and Chicago Avenue. Acetylene tanks were at the basis of the disaster, from which much loss of life and property resulted."

PARKINSON'S NEW RADIATOR.



The "UNIVERSITY."

See our Exhibit, STANDS Nos. 22/29, at the International Gas Exhibition, Earl's Court, Nov. 19 to Dec. 17.

PARKINSON AND W. & B. COWAN, LTD.
(*Parkinson Branch*),

COTTAGE LANE, CITY ROAD, LONDON. | BELL BARN ROAD, BIRMINGHAM.

Accident at the Faversham Gas-Works.—Some days ago, an accident occurred to the sulphate plant at the Faversham Gas-Works, injuring two men named Reginald Osborne and Thomas Adsley, both of whom were removed to the Cottage Hospital suffering from extensive scalding. A portion of the building was wrecked; but some boilers in it were not affected by the accident. Osborne subsequently died from his injuries.

Gas Lighting at the Colston Hall, Bristol.—When presiding at the annual meeting of the shareholders of the Colston Hall, Bristol, last Tuesday, the Right Hon. Lewis Fry stated that the hall was now one of the finest buildings for public assemblies that could be found in the country. Gas lighting had recently been introduced, and a great improvement had thereby been effected. Mr. A. N. Price, the Vice-Chairman of the Company, said the new system of gas lighting was an important one; and the results would be economical. Besides this, the installation provided an extremely efficient means of ventilation and draught prevention.

Newry in Darkness.—Last Sunday week, just at the time when the evening services were taking place, there was a temporary failure of the gas supply in Newry, which naturally caused inconvenience, though in most cases for only a few minutes. An explanation of the matter was subsequently furnished to the Council by the Gas Manager (Mr. B. Gibson), who stated that the occurrence was due to the leading stoker having forgotten to open the valve from the big holder to the little one, which supplied the town on Sunday. Mr. Ledlie remarked that the accident was only momentary; and no one regretted it more than the man in charge. The Chairman said it seemed to have been a pure accident.

Trawden Water Supply.—At Trawden, last Thursday, Mr. W. O. Meade-King held an inquiry, on behalf of the Local Government Board, into the application of the District Council to borrow £6350 for the purchase of the undertaking of the Trawden Water Company and the construction of additional works, including a reservoir on Boulsworth with a capacity of 100,000 gallons. Mr. Briggs, on behalf of the Council, said the need for the application arose owing to the present deficient supply of water, which was often diminished in dry weather to two or three hours' daily service. Mr. Pilgrim opposed the application on behalf of Mr. John Holt, the owner of an adjoining farm, on the ground that the reservoir, when in working order, would interfere with the supply of water on his farm.

Sulphur in Wandsworth Gas.—At their meeting last Wednesday, the Wandsworth Borough Council received a report from their Gas Examiner to the effect that on the 25th ult. the gas supplied by the Wandsworth and Putney Gas Company contained 34·3 grains of sulphur per 100 cubic feet. It was pointed out that the quantity of sulphur ought not to exceed 20 grains per 100 cubic feet, but that no forfeiture was incurred unless the excess amounted to 2 grains on the average of six consecutive week days, or 10 grains on any one day. The Secretary of the Company (Mr. C. W. Braine) wrote, in reply to a communication from the Town Clerk on the matter, that the sudden and severe change in the meteorological conditions had caused the excess of sulphur, and that the Council might rest assured that nothing would be left undone to reduce the amount to the statutory limit. The explanation was considered satisfactory.

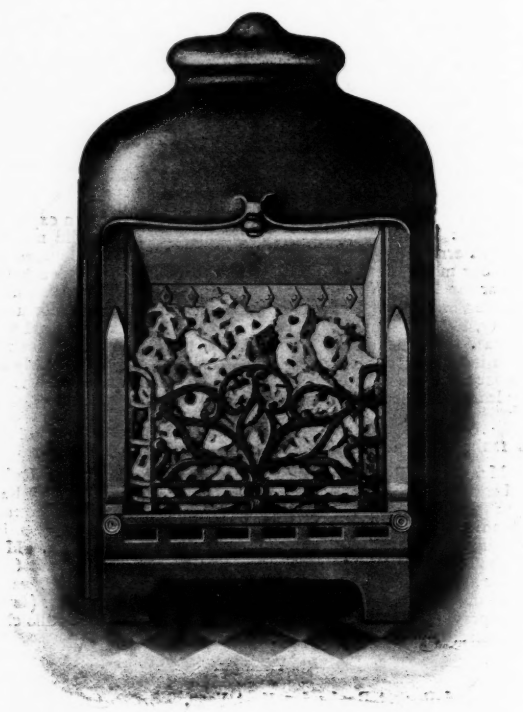
An Electric Lighting Annoyance.—Serious complaint was made at a meeting of the Exeter City Council last Wednesday respecting the failure of the electric light in High Street on a recent evening. Mr. Finch said the users of current in that thoroughfare were entirely deprived of light for 20 minutes or half-an-hour. His own business had to be suspended, and a neighbouring tradesman used candles. In a jeweller's shop diamond rings were being shown to a customer when the place was suddenly thrown into darkness. The shopkeeper thought it was a scheme to rob him, and ordered the doors to be locked until some other light could be obtained. The tradesmen of High Street were seriously considering the propriety of going back to gas and rejecting the electric light, which was a "rotten light." The Mayor said Mr. Finch ought to use more moderate language. Mr. Finch regretted that it was not a case for moderate language; it was exceedingly serious. The Electrical Engineer explained that the light went out on the occasion referred to because of injury to the main during excavations for the tramways. A great deal of damage had been done in this way; and though the outdoor staff was almost continuously engaged in making repairs, it was almost impossible to prevent inconvenience to the customers. Mr. Roberts thought someone was to blame for this damage. No private firm would submit to such want of foresight and of reasonable care on the part of employees as the Council were treated to.

North Warwickshire Water Company.—In moving the adoption of the report at the recent meeting of the North Warwickshire Water Company, Mr. R. Barnes referred to the sale made to the Coventry Corporation, and to the assertion of certain of the shareholders that the assets of the Company were now worthless. In disproof of this he said they had an average income of £660; and since the balance-sheet which accompanied the report was made out, they had entered into contracts for the supply of water from which an income of £520 was assured. This brought the total assured amount up to £1180, or £67 more than the Company were earning when they had the full populous district which, after arbitration proceedings, was parted with to the Coventry Corporation. They had also entered into a contract with the London and North-Western Railway Company from which a minimum income of £425 would be received; and negotiations were nearly completed with the Wyken Colliery from which it was anticipated that £850 per annum would be derived. There was therefore an increased income of £1275 to the Company since the report was sent out. The arbitration had been a great benefit, as the Company had had a large amount of capital supplied, without which they could not have undertaken these extensions. They had also been able to pay off the whole of the debentures, and had returned £7000 to the shareholders in bonuses. There was now every prospect of the shareholders receiving a dividend. Mr. Prescott proposed an amendment to the resolution, to the effect that the accounts be not received until they had been further investigated; and this was carried.

The "MAIN"

Gas Fires

NEW AND ARTISTIC DESIGNS.



Burner and Bricks removable; extra deep Fire.

The "WESTMINSTER" No. 1030 . . £2

International Gas Exhibition, Earl's Court, London.

See our Exhibit,

STANDS Nos. 14, 25, & 26 (Ducal Hall).

R. & A. MAIN, LTD.,

LONDON. GLASGOW. FALKIRK, &c.

Southport Gas Supply.—Particulars just compiled by the Gas Engineer of the Southport Corporation (Mr. J. Bond) show that the plant at Crowlands is capable of producing 3,400,000 cubic feet of gas per day; the maximum day's make being 2,291,000 cubic feet. There is also plant for the manufacture of sulphate of ammonia and for the distillation of tar. The limits of supply are all places within a radius of 6 miles from the Southport Town Hall; and the price of gas is 2s. 8d. per 1000 cubic feet within and 3s. 2d. outside the borough. The annual make of gas has risen since 1893 from 323,481,000 cubic feet to 451,332,000 cubic feet; the average illuminating power ranging from 21·70 down to 17·02 candles. The total capital expenditure to March 31 last has been £266,148; and a total of £74,348 has been applied in repayment of loans.

Unsatisfactory Results at the Elland Electricity Works.—The relations between the Elland District Council and their staff at the electricity works are at present somewhat strained; so much so, indeed, that the Electrical Engineer (Mr. C. R. Heron) has tendered his resignation. This situation has arisen in consequence of a decision of the Electricity Sub-Committee, which has been confirmed by the Council, to dispense with the services of the Assistant-Engineer at the works. Mr. Heron looked upon the retention of this officer as a necessity; and he endeavoured to convince the Committee that in the long run it would be the more economical course to follow his advice in this matter. They, however, did not think fit to do so. Coupled with this trouble, there is one with respect to the engines. The Committee have pointed out to the Consulting Engineer (Mr. W. Emmott) that they are taking considerably more coal to generate the current than he estimated; and he is asked for some observations on this point. What current there is does not appear to be giving satisfaction; for the Secretary of the Liberal Club has had to complain of the "unsteady supply." The Council decided to send him a "suitable reply."

The Gas Committee of the Salford Corporation have accepted the tender of Messrs. Tennant and Co. for supplying about 1700 tons of sulphuric acid, of 150° Twaddel, at 39s. per ton.

The Secretary of the Consolidated Kent Collieries Corporation, Limited, states that the quality of the coal passed through in sinking the shaft at about 1190 feet has exceeded anticipations, and proved an excellent gas coal, which cokes readily and fires very freely. This is taken to be a strong indication of the superior quality of the lower seams, the first of which, at 1273 feet, will shortly be reached.

The clerical staff and employees of the Folkestone Gas Company were a few days ago entertained at a smoking concert by the Secretary, Mr. W. Griffin. In the course of the proceedings, the health of Mr. Griffin was proposed by one of the employees, and most cordially honoured. In responding, Mr. Griffin remarked that in Folkestone there were no large industries; but the Company which employed the largest amount of labour was the Gas Company. He gave a few figures to show the position of the undertaking and the extent of its operations, and appealed to the men to hang together to ensure its continued success. They had, he said, the friendly opposition of the Electric Light Company; but there was no novelty in electricity now—the novelty was in gas. He quoted from the article in the "Lancet," reproduced in the "JOURNAL" for the 29th ult., the remarks on the value of the incandescent gas-light, and concluded by proposing the healths of the Mayor (Alderman Banks, J.P., who is Chairman of the Company) and Mr. Gardner, one of the Directors. The Mayor, in responding, pointed out that the interests of the men and their employers were identical, and said that if the men would do their duty to the Company, the Company would do theirs to them, and they would be friends. Mr. Gardner also briefly replied. The concert, which Mr. Griffin hopes to make an annual social gathering, was thoroughly successful.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

TRAVELLER. No. 4308.
WORKING MANAGER. Cleobury Mortimer Gas-Works.
GENERAL FOREMAN. Halifax Tar-Works. Applications by Dec. 17.
WORKING FOREMAN. Wilmslow Gas-Works.
FOREMAN GAS FITTINGS DEPARTMENT. No. 4309.
MAIN AND SERVICE LAYER. Rhymney and Aber Valleys Gas and Water Company.

Situations Wanted.

INCANDESCENT LIGHTING AND MAINTENANCE, &c. No. 4307.
MANAGER SMALL WORKS. No. 4310.

Patent Rights for Disposal. Redman and Co., Bradford.

Plant for Sale.

1000-LIGHT STATION METER. George Wilson, Stands Nos. 73 and 98, Gas Exhibition.

Stocks and Shares.

CITY OF NORWICH WATER COMPANY. Dec. 31.
NEWCASTLE AND GATESHEAD WATER COMPANY. Jan. 17.

TENDERS FOR

Compressors and Engines.
STOCKPORT GAS DEPARTMENT. Tenders by Dec. 20.

Condensers (Water Tube and Pelouze and Audouin).
EDINBURGH AND LEITH GAS COMMISSIONERS. Tenders by Jan. 30.

Fire-Clay Goods.
TODMORDEN GAS DEPARTMENT. Tenders by Dec. 20.

Gas Exhausters and Engines.
EDINBURGH AND LEITH GAS COMMISSIONERS. Tenders by Jan. 30.

General Stores, &c.
ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY. Tenders by Dec. 27.

Oil for Gas Making.
BIRKENHEAD GAS DEPARTMENT. Tenders by Dec. 29.
LOUGHBOROUGH GAS DEPARTMENT. Tenders by Dec. 23.

Pipes and Specials.
LEIGH WATER DEPARTMENT. Tenders by Dec. 14.

Retort-Setting.
TODMORDEN GAS DEPARTMENT. Tenders by Dec. 20

Station Meter.
EDINBURGH AND LEITH GAS COMMISSIONERS. Tenders by Jan. 30.

Tar and Ammoniacal Liquor.
BRIDGEWATER COLLIERIES COKE WORKS. Tenders by Dec. 19.
LLANDUDNO GAS DEPARTMENT. Terders by Dec. 31.
WORKSOP GAS COMPANY. Tenders by Dec. 28.

Washer & Liquor Cooler & Washer-Scrubbers.
EDINBURGH AND LEITH GAS COMMISSIONERS. Tenders by Jan. 30.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 834.

Issue.	Share.	When ex Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 13	10½	Alliance & Dublin 10 p.c.	20½—21½	..	4 17 8
100,000	10	,,	7½	Do. 7 p.c.	13½—14½	+½	5 3 5
200,000	5	Nov. 11	6½	Bombay, Ltd.. . . .	0—6½	..	5 0 0
140,000	5	,,	6½	Do. New, £4 paid	4½—5	..	5 4 0
50,000	10	Aug. 31	14	Bourne-) 10 p.c. . .	29—30	..	4 13 4
251,810	10	,,	7	mouth Gas) B 7 p.c. .	15½—16½	..	4 4 10
53,200	10	,,	6	and Water) Pref. 6 p.c.	14½—15½	..	3 17 5
380,000	Stk.	Aug. 12	12	Brentford Consolidated	245 250	..	4 16 0
300,000	,,	,,	9	Do. New . . .	187—192	..	4 13 9
50,000	,,	,,	5	Do. 5 p.c. Pref. .	125—130	..	3 16 11
206,250	,,	June 10	4	Do. 4 p.c. Deb. .	107—110	+3	3 12 9
220,000	Stk.	Sept. 15	11	Brighton & Hove Orig.	220—225	..	4 17 9
246,320	,,	,,	8	Do. A. Ord. Stk. .	162—167	..	4 15 10
460,000	20	Sept. 29	10	British	40—41	..	4 17 7
100,000	Stk.	Aug. 12	6	Bromley, Ord. 5 p.c. .	117—122	..	4 18 4
165,700	,,	,,	4½	Do. do. 3½ p.c. .	92—95	..	4 13 9
500,000	10	Oct. 13	7	Buenos Ayres (New) Ltd.	11¼—11⅝	..	5 19 2
250,000	Stk.	June 29	4	Do. 4 p.c. Deb. .	95—97	..	4 2 6
150,000	20	July 14	8¼	Cagliari, Ltd.	22—24	..	6 17 6
100,020	10	Sept. 29	10	Cape Town & Dis., Ltd.	14⅝—15¼	..	6 11 2
100,000	10	Oct. 27	4½	Do. 4½ p.c Pref.. .	9¼—9⅝	..	4 12 4
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	51—53	..	5 13 2
50,000	Stk.	June 29	4½	Do. 4½ p.c. Deb. Stk.	100—102	..	4 8 3
1,375,000	Stk.	Aug. 31	5⅛	Commercial 4 p.c Stk. .	112—114	+2	4 11 2
560,000	,,	,,	5	Do. 3½ p.c. do. .	107—109	+1	4 11 9
450,000	,,	June 10	3	Do. 3 p.c. Deb. Stk.	86—88	..	3 8 2
800,000	Stk.	June 10	6½†	Continental Union, Ltd.	109—112	+5	5 16 1
200,000	,,	,,	7	Do. 7 p c. Pref.	137—142	+2	4 18 7
486,090	10	July 14	11	European, Ltd. . . .	20—21	..	5 4 9
354,060	10	,,	11	Do. £7 10s. paid	14—15	..	5 10 0
15,243,200	Stk.	Aug. 12	4⅞	Gas-) 4 p.c. Ord. . .	98—100	+1	4 8 0
2,600,000	,,	,,	3⅜	light) 3½ p.c. max. . .	91—93	+1	3 15 3
3,799,735	,,	,,	4	and) 4 p.c. Con. Pref.	108—110	..	3 12 9
4,193,975	,,	June 29	3	Coke) 3 p.c. Con. Deb.	87—89	..	3 7 5
258,740	Stk.	Sept. 15	5	Hastings & St. L. 3½ p.c.	90—95	..	5 5 3
70,000	10	Sept. 29	11	Hongkong & China, Ltd.	15—16	..	6 17 6
3,800,000	Stk,	Nov. 11	10	Imperial Continental .	205—207	..	4 16 7
473,600	Stk.	Aug. 12	3½	Do. 3½ p.c. Deb. Red.	96—98	..	3 11 4
175,036	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c. .	117—122	..	4 18 4
561,000	Stk.	Aug. 31	10	Liverpool United A . .	218—220	..	4 10 11
718,100	,,	,,	7	Do. do. B . .	159—161	..	4 6 11
306,083	,,	June 29	4	Do. do. Deb. Stk.	108—110	+1	3 12 9

Issue.	Share.	When ex Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
75,000	5	June 29	5	Malta & Medn., Ltd. .	4¼—4⅝	..	5 5 3
560,000	100	Oct. 1	5	Met. of) 5 p.c. Deb..	102—104	..	4 16 2
250,000	100	,,	4½	Melbourne) 4½ p.c. Deb.	100—102	..	4 8 3
541,920	20	Nov. 11	3½	Monte Video, Ltd. . .	10—11	..	6 7 3
1,515,892	Stk.	July 29	4½	Newc'tle & G'tesh'd Con.	109—110	+½	4 1 10
406,625	Stk.	July 1	3½	Do. 3½ p.c. Deb.	92—92½	..	3 15 8
15,000	10	Aug. 31	10	North Middlesex 10 p.c.	19½—20½	..	4 17 7
52,940	10	,,	7	Do. 7 p.c.	13½—14⅝	..	4 16 7
300,000	Stk.	Nov. 30	8	Oriental, Ltd. . . .	145—149*	+1	5 7 5
600,000	5	Sept. 15	7	Ottoman, Ltd. . .	5½—6½	..	5 12 0
235,005	Stk.	—	6⅛	Plym'th & St'house 5 p.c.	—	..	—
398,490	5	Apl. 28	5	Primitiva Ord. . . .	5⅜—6	..	4 3 4
796,980	5	July 28	5	Do. 5 p.c. Pref. .	4¾—5⅛	..	4 15 3
488,900	100	Dec. 1	4	Do. 4 p.c. Deb. .	93—95*	+1	4 4 3
851,070	10	Oct. 13	7	River Plate Ord. . . .	11½—12	..	5 16 8
300,000	Stk.	June 29	4	Do. 4 p.c. Deb. .	95—97	..	4 2 6
250,000	10	Sept. 15	6	San Paulo, Ltd. . . .	12—12⅛	..	4 16 0
70,020	50	June 29	5	Do. 5 p.c. Deb. .	51—53	..	4 14 4
135,000	Stk.	Sept. 15	10	Sheffield A	238—240	..	4 3 4
209,984	,,	,,	10	Do. B	237—239	..	4 3 8
523,498	,,	,,	10	Do. C	236—238	..	4 4 0
123,998	Stk.	Sept. 29	5	Shrewsbury Ord. 5 p.c.	104½—107½	..	4 13 0
70,000	10	,,	11	South African	16—17	..	6 9 5
6,250,000	Stk.	Aug. 12	5⅛	South Met., 4 p.c. Ord.	129—131	..	4 4 0
1,832,700	,,	July 14	3	Do. 3 p.c. Deb.	89—91	+1	3 5 11
575,000	Stk.	Aug. 31	5⅓	S'th Suburb'n Ord. 5 p.c.	122—125	..	4 8 0
60,000	,,	,,	5	Do. 5 p.c. Pref. . .	120—125	..	4 0 0
112,533	,,	July 14	5	Do. 5 p.c. Deb. Stk.	133—138	..	3 12 6
502,310	Stk.	Nov. 11	5	Southampton Ord. . .	103—107	..	4 13 6
87,950	,,	—	4	Do. 4 p.c. Deb.	—	..	—
120,000	Stk.	Aug. 31	6¼	Tottenham) A 5 p.c. .	122—127	..	4 18 5
325,520	,,	,,	4⅛	and) B 3½ p.c. .	95—100	—2	4 15 0
115,000	,,	June 29	4	Edmonton) 4 p.c. Deb.	104—107	..	3 14 9
182,380	10	June 10	8	Tuscan, Ltd.	8⅝—9⅛	+⅛	8 13 0
149,900	10	July 1	5	Do. 5 p c. Deb. Red.	96—98	..	5 2 0
30,000	Stk.	Aug. 31	7⅜	Wands-) A 5 p.c. . .	160—165	..	4 13 11
255,636	,,	,,	6⅞	worth) B 3½ p.c. . .	130—135	..	4 12 7
51,293	,,	,,	5⅛	and) C 3½ p.c. . .	110—115	..	4 13 6
57,564	,,	June 29	3	Putney) 3 p.c. Deb. Stk.	78—83	..	5 12 8
745,872	,,	Aug. 12	5	West Ham 5 p.c. Ord. .	99—101	..	4 19 0
85,000	,,	,,	5	Do. 5 p.c. Pref. . .	117—122	..	4 2 0
160,000	,,	June 29	4	Do. 4 p.c. Deb. Stk.	103—108	..	3 14 1

Prices marked * are Ex div. † Next dividend will be at this rate.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.
Payable in Advance. If credit is taken, the charge is 25s. a year.
Abroad (in the Postal Union): £1 7s. 6d., payable in Advance.

All Communications, Remittances, &c., to be addressed to
WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE has a larger annual sale than all other Oxides combined.

SPENT OXIDE purchased in any district.

GAS PURIFICATION & CHEMICAL CO., LD.

JOHN WM. O'NEILL, Managing Director,

PALMERSTON HOUSE, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

SPECIAL PAINT FOR GAS-WORKS.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

BROTHERTON & CO., LIMITED.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

GLASS SHADES of every description, for all kinds of Interior **GAS LIGHTING.**
Illustrated sheets on application.
JOHN WALSH WALSH,
SOHO AND VESTA GLASS WORKS, BIRMINGHAM.
Telegrams: "VESTA, BIRMINGHAM."
National Telephone: No. 63.
London Show-Room: 4, HOLBORN CIRCUS, E.C.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PATENTS AND TRADE MARKS
PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
See our exhibit at the International Gas Exhibition, Earl's Court, Nov. 19 to Dec. 17.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams: SATURATORS, BOLTON. Telephone 0848.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

SPENT OXIDE.
THE South Metropolitan Gas Company are always open to receive OFFERS of SPENT OXIDE.
Chief Office: 709, Old Kent Road, London, S.E.
Telegrams: "METROGAS, LONDON."

THE HANWELL PATENT RISING & FALLING GAS PENDANT (as described in the JOURNAL for Nov. 22, p. 599), can be seen at the Gas Exhibition, STAND No. 154, Queen's Palace.
THE HANWELL PENDANT COMPANY, Abington Street, NORTHAMPTON.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

DUTCH OXIDE OF IRON.

THE First Dutch Bog Ore Co., Ltd., (Eerste Hollandsche Yzererts Maaty), ROTTERDAM.
General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.
London Managers—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

ATTERTON'S Patent Charging Machine, especially adapted for Small Works up to 50 Millions. Nearly 40 already supplied, and still supplying. Would soon repay for small outlay. Increased make and reduction in cost.
Apply to E. PADFIELD AND CO., 96 & 98, Leadenhall Street, LONDON, E.C.

PATENT RIGHTS FOR DISPOSAL.
RETORTS.—Something new in Retorts and their charging, which will do away with many of the disadvantages of the present inclined and vertical systems, and which will also include many advantages hitherto unheard of. They save capital expenditure, gas, time, and labour. They are equally adaptable to medium and small, as well as to large works.
See our advertisement on page 871.
T. REDMAN & CO.
The Priory, Bradford.

GASHOLDER PAINTING.
PAINTING Work for all kinds of Gas- Works Plant undertaken by contract or otherwise.
FREDERICK BOYALL, 31, Regent's Row, Queen's Road, DALSTON, N.E. Established 1850.

GAS Manager, disengaged, requires Charge of Works, from 5 to 10 Millions. Thoroughly efficient in all details, and can guarantee excellent results.
Address No. 4310, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS Distribution—Young Man (Age 27), disengaged shortly, desires RE-ENGAGEMENT. Experienced in Slot Installations, Incandescent Lighting and Maintenance, Estimating, and Canvassing. First-Class References.
Address No. 4307, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS—Wanted, a Working Manager for small Works. Wages 25s. per week.
Apply to the SECRETARY, Gas-Works, CLEOBURY MORTIMER.

A FIRM of Gas Engineers require a Traveller with good connection and knowledge of Gas-Works Plant requirements and General Constructional Engineering Trade. Must be energetic.
Apply, by letter, stating full Particulars of previous Experience, with Terms required, to No. 4308, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

HALIFAX CORPORATION TAR-WORKS.
WANTED, a General Foreman for the above works. Must have had Experience in the Distillation of Tar and working up of the Products.
Salary, £130 per annum.
Applications, stating Age, Experience, and accompanied by References, to be sent to the Chairman of Committee (Councillor G. H. WADSWORTH, Esq.,), endorsed "General Foreman," on or before Dec. 17, 1904.

WANTED, a Steady, Reliable Man, who thoroughly understands the routine of a Gas-Works, as WORKING FOREMAN.
Apply, with Testimonials, stating Wages required, to the undersigned, from whom list of duties may be obtained.
WM. SEVERS,
Engineer and Manager.
Gas-Works, Wilmslow,
Dec. 10, 1904.

OXIDE OF IRON.
(NATURAL.)
BALE & CHURCH will be pleased to send Samples and Quotations, and make Offers for SPENT OXIDE.
BALE'S FIRE CEMENT, PAINT, AND GAS COAL.
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.
SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, AND MESSEL, LIMITED, 36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

COAL GAS TAR wanted.
BEST PRICES GIVEN.
SHARPNESS CHEMICAL COMPANY, LIMITED, Sharpness Docks, GLOS.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

WANTED, a Main and Service Layer.
Wages, 32s. per week.
Apply, by letter, in own hand-writing, stating Age and Experience, together with *copies* of recent Testimonials as to sobriety and abilities, to the RHYMNEY AND ABER VALLEYS GAS AND WATER COMPANY, Caerphilly, near CARDIFF.

WANTED, an Energetic Foreman to Take Charge of workmen in a Gas Fittings Company in the South of England. Must be a practical man, Good Organizer, able to Estimate work and recommend intending consumers upon Installations connected with Gas Lighting. Must have held a similar position and be a steady and reliable man. Age not to exceed 40 Years.
Apply, by letter, not later than the 21st inst., with *copies* of not more than Three Testimonials, and stating Salary required, to No. 4309, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

NEW Gasholder, 40 ft. diameter by 12 ft. deep, with Steel Standards; also new STEEL TANK to contain same.
Write J. WRIGHT, 181, Queen Victoria Street, LONDON, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

FOR SALE.
TO be disposed of, a 1000-Light Station METER, in Cylindrical Cast-Iron Case, Inlet and Outlet 6-inches, 5000 cubic feet per hour capacity, with jumping Index, Clock, and Cylindrical Tell Tale. Now on view at my STAND, No. 73 and 98, International Gas Exhibition, Earl's Court, London.
Full Particulars on application at STAND, or from GEORGE WILSON, Gas-Meter Manufacturer, 254, Foleshill Road, COVENTRY.

BOROUGH OF LEIGH.
(WATER DEPARTMENT.)
THE Gas and Water Committee of the above Corporation invite TENDERS for the supply and delivery of about 4440 yards of 14-inch diameter Cast-Iron Socket and Spigot PIPES and SPECIALS.
Specification, Forms of Tender, and any further Particulars may be obtained on application from the undersigned.
Sealed Tenders to be delivered to Mr. Peregrine Thomas, Town Clerk, Town Hall, Leigh, Lancashire, on or before Twelve o'clock noon on Wednesday, the 14th day of December, 1904.
Tenders to be endorsed "Tender for 14-inch Cast-Iron Pipes."
JAMES GIBSON,
Engineer and Manager.
Gas and Water Offices,
Leigh, Lancs, Dec. 6, 1904.

ROBERT DEMPSTER & SONS, Ltd.,
Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

GAS and Water Works Supplies and Construction Company, Limited, are open to purchase small or large Gas-Works. Constructors for all Gas and Water Work and Main Laying. All Gas and Water Works Plant and Fittings supplied. Gas and Water Works Financed. Shares and Stock accepted in part payment for Work and Materials supplied. Gas and Water Works Shares and Stock Underwritten and Issued.
LONDON OFFICE, 99, CANNON STREET, E.C.

THE Llandudno Urban District Council invite TENDERS for the purchase of surplus AMMONIACAL LIQUOR and TAR to be made during a period of Twelve Months next ensuing.

Tenders to be sent in to the undersigned on or before the 31st day of December inst., endorsed "Liquor and Tar."

(Signed) ALFRED CONOLLY,
Clerk to the Council.

Town Hall, Llandudno,
Dec. 6, 1904.

TODMORDEN CORPORATION.
(GAS DEPARTMENT.)

TO RETORT AND FIRE-BRICK MANUFACTURERS, &c.

THE Gas Committee of the above Corporation are prepared to receive TENDERS for the supply of the necessary RETORTS, FIRE-BRICKS, &c., also the RETORT SETTING, required for the Year ending March 31, 1906.

Full Particulars and Form of Tender may be had on application to the Engineer and Manager, Mr. Hy. Hawkins.

Tenders endorsed "Retorts, &c.," to be delivered at the Town Clerk's Office, Town Hall, Todmorden, addressed to the Chairman, of the Gas Committee, on or before Ten a.m. on the 20th inst.

The Committee do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to accept a portion of any Tender.

By order,
H. HAWKINS,
Engineer and Manager.

Gas-Works, Todmorden,
Dec. 9, 1904.

COUNTY BOROUGH OF BIRKENHEAD.

TO OIL IMPORTERS AND DISTILLERS.

THE Corporation of Birkenhead are prepared to receive TENDERS for the supply of about 3000 Tons per annum of GAS OIL, for the manufacture of Carburetted Water Gas, delivered free into their Oil Stores at Ilchester Wharf, Birkenhead Docks, for a period of One, Two, or Three years commencing on the 1st of April, 1905, deliveries as the Gas Engineer may direct.

The Oil to have a specific gravity of not over ·875 at 60° Fahr., with a minimum flash point of 100° Fahr., and containing no residuum.

Samples of the Oils tendered for, together with analysis, must be sent to the Gas Engineer, at the Gas-Works, and properly labelled with the name of the firm and the number and name of the oil corresponding to the Tender.

Any other Information may be obtained from the Gas Engineer, Mr. T. O. Paterson, M.Inst.C.E., Gas-Works, Thomas Street, Birkenhead.

Tenders, stating price per Imperial Gallon, sealed and endorsed "Tender for Gas Oil," to be sent in to me not later than Five o'clock in the afternoon of Thursday, December 29, 1904.

The Corporation do not bind themselves to accept the lowest or any Tender.

By order,
ALFRED GILL,
Town Clerk.

Town Hall, Birkenhead,
Dec. 10, 1904.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

GAS-WORKS PLANT AND APPLIANCES.

THE Commissioners are prepared to receive TENDERS for the supply of all or any of the following Plant and Appliances delivered and erected at their Granton Works. The whole of the work is to be carried out in conformitywith the General Conditions and Clauses of Commissioners' Specification, and is to be delivered, completed, and put to work, on or before the 31st day of December, 1905.

1.—GAS EXHAUSTERS and ENGINES.
2.—WATER TUBE CONDENSERS for Coal Gas.
3.—GAS WASHER and LIQUOR COOLER.
4.—PELOUZE and AUDOUIN CONDENSER.
5.—WASHER-SCRUBBER of the Rotary Type for Coal Gas.
6.—WASHER-SCRUBBER and Appliances for extraction of Cyanide compounds.
7.—STATION METER.

Specification, Schedule of Quantities, and Form of Tender, may be obtained on application to Mr. W. R. Herring, M.Inst.C.E., Chief Engineer and Manager, New Street Gas-Works, Edinburgh, on receipt of a crossed cheque for Five Guineas, which will be returned when a *bonâ-fide* Tender is received.

Tenders to be lodged with the undersigned on or before Monday, the 30th day of January, 1905, at Ten a.m., sealed and endorsed as directed under each portion of the Plant.

The Commissioners do not bind themselves to accept the lowest or any Offer.

JAMES MCG. JACK,
Clerk.

25, Waterloo Place, Edinburgh,
Dec.

BOROUGH OF LOUGHBOROUGH.
(GAS DEPARTMENT.)

TENDERS are invited for the supply of 350 Tons of OIL (Russian or American) suitable for Water-Gas making purposes, for One, Two, or Three Years, delivered at Loughborough Station.

Tenders must be addressed and delivered to H. Perkins, Esq., the Town Clerk, Town Hall, Loughborough, not later than the 23rd inst., and marked on the outside "Tender for Gas Oil."

EDWARD ONIONS,
Engineer and Manager.

Gas-Works, Loughborough,
Dec. 10, 1904.

BRIDGEWATER COLLIERIES COKE WORKS.
(THE EARL OF ELLESMERE).

TENDERS are invited for the Tar pro- duced at the above Works for a period of Six or Twelve Months from the 1st of January, 1905, delivered into Contractor's Tanks at the Bridgewater Colliery siding, Warton Hall, on the Pendleton and Hindley branch of the Lancashire and Yorkshire Railway; or at the Brackley siding, Little Hulton Mineral branch of the London and North Western Railway.

The estimated quantity is 2500 Tons per annum.

Tenders, endorsed "Tender for Tar," to be addressed to Mr. Thomas M. Brown, Bridgewater Coal Offices, 4, Chapel Walks, Manchester, on or before the 19th of December.

Manchester, Nov. 19, 1904.

THE Directors of the Worksop Gas Company invite TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR made at their Works during the Twelve Months commencing the 1st of January, 1905.

Tenders for Tar to state price per Ton delivered into Purchaser's Tanks at the Worksop Railway Station.

Tenders for Liquor to state price per Ton as tested by No. 1 Twaddel Hydrometer, delivered into boats near the Company's Works, or price per Ton delivered into Purchaser's Tanks at the Railway Station.

The Directors do not bind themselves to accept the highest or any Tender.

Tenders to be sent in by the 28th of December.

Worksop, Dec. 7, 1904.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

THE Directors of the above Company are prepared to receive TENDERS from Iron Founders, Gun Barrel Manufacturers, Timber Merchants, Druggists, Ropemakers, &c., for GOODS to be delivered on the Company's Works, Great Brunswick Street, in such quantities as may be required from time to time up to the 31st of December, 1905.

Samples of goods required are open to inspection on the Works, Great Brunswick Street, and printed lists of articles required can be had on application at the Company's Offices, D'Olier Street.

Tenders, endorsed "Tenders for Stores," to be lodged in my Office on or before the 27th inst.

FRANCIS T. COTTON,
Secretary and Manager.

Head Offices: D'Olier Street,
Dublin, Dec. 9, 1904.

COUNTY BOROUGH OF STOCKPORT.
(GAS AND ELECTRICITY DEPARTMENT.)

THE Gas and Electricity Committee are prepared to receive TENDERS for the supply and erection of Two COMPRESSORS and ENGINES combined, capable of compressing to 25 lbs per square inch 20,000 cubic feet of Coal Gas per hour, with 3-inch to 12-inch Water-Gauge head on suction.

All firms Tendering shall send to the Engineer, Mr. S. Meunier, Portwood Gas-Works, Stockport, full detailed Drawings and complete Specification of the apparatus they intend to supply not later than the 20th inst., but shall not state any price thereon.

General Conditions of Contract and Particulars can be obtained on application to the Engineer.

Tenders, endorsed "Compressors," and addressed to the Chairman of the Gas and Electricity Committee, must be delivered on or before the 22nd inst., not later than Three p.m., at Portwood Gas-Works.

No Tender will be accepted without satisfactory proof that the firm Tendering pays the standard rate of wages and observes the standard number of hours, and the Committee do not bind themselves to accept the lowest or any Tender.

By order,
ROBERT HYDE,
Town Clerk.

Stockport, Dec. 9, 1904.

NEWCASTLE AND GATESHEAD WATER COMPANY.

SALE BY AUCTION OF £54,000 (OR THEREABOUTS) OF SEVEN PER CENT. MAXIMUM ORDINARY STOCK (ACT 1898).

MR. CHARLES A. JOEL will Sell by AUCTION, at the Company's Offices, Pilgrim Street, Newcastle-on-Tyne, on Tuesday, the 17th of January, 1905, at Half-past Twelve o'clock in the Afternoon, £54,000 (or thereabouts) of 7 PER CENT. MAXIMUM ORDINARY STOCK, under the Act of 1898, in Lots of £100.

The above Stock is the balance of the 7 per cent. Maximum Ordinary Stock created under the powers of the Newcastle and Gateshead Water-Works Act, 1898.

The dividend is subject to proportionate diminution whenever the maximum dividend to which each class of Ordinary Stock of the Company is entitled shall not be paid in full; but such diminution may be made up in subsequent years.

Printed Particulars and Conditions of Sale may be had at the Company's Offices, and Messrs. George Armstrong and Sons, Solicitors, Newcastle-on-Tyne; or of the Auctioneer, 27, Northumberland Street, Newcastle-on-Tyne.

GEORGE SMITH,
Secretary and General Manager.

Newcastle-on-Tyne, Dec. 7, 1904.

CITY OF NORWICH WATER-WORKS COMPANY.
INCORPORATED BY THE CITY OF NORWICH WATER-WORKS ACT, 1850.

SALE BY TENDER OF 1000 £10 ORDINARY SHARES.

THE Directors invite Tenders (at not less than the value of £16 5s. per Share) for the purchase of 1000 ORDINARY £10 SHARES in the above-named Company. The Shares will be issued as fully paid, and will constitute a portion of the Additional Capital authorized to be raised under the powers and provisions contained in the City of Norwich Water-Works Act, 1898.

These Shares rank for a Maximum Dividend of 6 per cent. per annum, and the Dividends on similar Shares have for the last 13 Years been paid at the rate of 6 per cent. per annum.

Payment for the Shares is to be made on or before the 14th of January, 1905.

The Dividends are paid half-yearly, and will accrue from the 14th of January next.

Particulars, with Forms of Tender, may be obtained on application to the Secretary, to whom Tenders, marked "Tenders for Shares," must be delivered on or before the 31st of December next.

By order of the Directors,
G. CHRISTOPHER DAVIES,
Secretary.

11, Prince of Wales Road,
Norwich, Nov. 14, 1904.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER,
Gas Engineers' Agents and Contractors for METERS, FIRE-CLAY GOODS, OXIDE OF IRON, AND ALL OTHER GAS APPARATUS.
Inquiries Solicited.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.

For Particulars, Price, &c., apply to Mr. EDWARD PRICE, "Langley," Wyke Avenue, WORTHING.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

RAILS.
New and Second-Hand with all Accessories; also Tip Waggons and Turntables.
B. M. RENTON,
MIDLAND WORKS,
SHEFFIELD.

TROTTER, HAINES, & CORBETT, LIMITED,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
Shipments Promptly and Carefully Executed.

London Office: R. Cull, 34, Old Broad Street, E.C.

Gas Companies are solicited to try Samples of the
MIRFIELD GAS COAL
UNEQUALLED.
Sperm Value 878·85 lbs. per Ton.

Prices and Analysis on application.
The MIRFIELD (GAS-COAL) COLLIERIES CO.,
RAVENSTHORPE, NEAR DEWSBURY.

HEATHCOTE GAS COAL.
Rich in Illuminating Power and yield of Gas
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.
THE GRASSMOOR CO., LD.,
CHESTERFIELD.

WATERINE.
REGISTERED.

The most powerful and efficient but withal absolutely harmless Water Softener and Purifier.

Descriptive Pamphlet and Prices on application to
THE WILSON CHEMICAL CO.,
30/34, MINCING LANE, LONDON, E.C.

SOMETHING NEW.

Mr. Micawber expected something good to turn up.

IT HAS.

APPLY
OUR STAND,
Ducal Hall, Earl's Court.
THE
IMPERIAL STOVE COMPANY,
LEAMINGTON.

THE
"ROTARY"
STATION METER.
Efficiency Demonstrated.

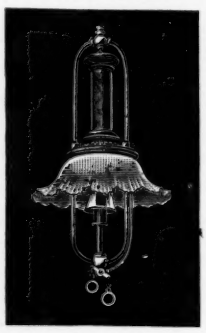
APPLY—
T. G. MARSH,
MAWSON CHAMBERS, DEANSGATE,
MANCHESTER.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
Note.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
London Office:
90, CANNON STREET, E.C.

PATENT RECUPERATIVE
INCANDESCENT GAS LAMP.
The only Lamp with absolutely DUST AND INSECT PROOF BURNER.
MANY DETAIL IMPROVEMENTS.
This Burner being positively Dust and Draught Proof, it prolongs the life of the Mantle and Saves its Cost in Maintenance.
See Testimonials.



SEE OUR EXHIBIT, STAND 41A, ANNEXE, GAS EXHIBITION.

THE POPULAR LAMP.
6.A. Fig. 6. Enamelled White Case and Flat Opal Reflector or Crimped Opal.

A. E. PODMORE & CO.,
Patentees and Manufacturers,
33, Charles St., Hatton Garden, E.C.
Telephone 6600 Central. Telegrams: "Promerope."

Now Ready, pp. 584 & XVI. *251 Illustrations.* *F'Cap. Quarto, Price 18s. net (Post Free).*

THE SEVENTH EDITION OF
NEWBIGGING'S HANDBOOK
FOR GAS ENGINEERS & MANAGERS
(DEDICATED TO SIR GEORGE LIVESEY).

The Work has been revised throughout, and contains 40 pages of Letterpress and 12 Illustrations more than the last Edition.
In almost every department additions have been made; and it is believed that the labour bestowed on its production will enhance the value of the book as a Work of Reference.

Orders may be sent through any Bookseller, or direct to the Publisher,
WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

All People interested in

INCANDESCENT GAS LIGHTING

will do well to ask for our

NEW ILLUSTRATED CATALOGUE,

the most detailed one for

BURNERS, MANTLES, & SPECIALITIES ON THE MARKET.

Prices greatly reduced.

The Solar Incandescent Gas Light Co.,

23, CHARTERHOUSE BUILDINGS, ALDERSGATE, E.C.

CASES FOR BINDING QUARTERLY VOLUMES OF THE "JOURNAL"

PRICE 2s. EACH.

WILSON CARTER & PEARSON LIMITED,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station, or for Export, all kinds of Fuel for Gas and Other Purposes.

ADDRESS CHIEF OFFICES:

Temple Buildings, 50, New Street, Birmingham.

THE THAMES BANK IRON CO.

UPPER GROUND STREET, LONDON, S.E.

SUPPLY FROM STOCK

CAST-IRON RETORTS AND ALL KINDS OF GAS-WORKS APPARATUS.

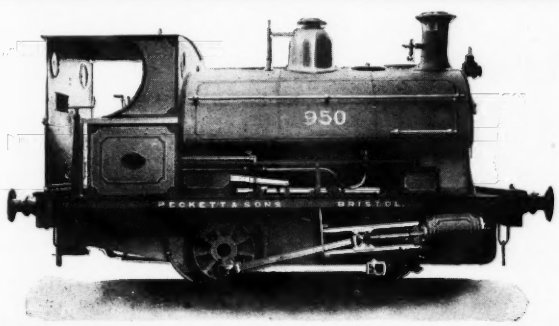
SOCKET-PIPES FOR GAS OR WATER PURPOSES.

FLANGE PIPES FOR STEAM.

Sole Manufacturers of **LYON'S "PATENT" GAS-MAIN SYPHONS.**

AGENTS FOR

ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.



LOCOMOTIVES

LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various Sizes always in Stock, ready for immediate Delivery.

Photographs, Specifications, and Prices on Application.

PECKETT & SONS, Atlas Locomotive Works, BRISTOL.

Telegraphic Address: "PECKETT, BRISTOL."

TAR-FOG: Oh Yes! Naphthalene.

Our **P**RIMARY **C**LEANSER strips the crude gas of every particle of

TAR-FOG,

lightens the work and labour of all further purifying departments, and increases their capacity.

We make you a present of this apparatus, and also a portion of the savings effected. It will prove the best remedy for the unwelcome Naphthalene visits that take place so mysteriously and unexpectedly under atmospheric changes.

Telegraphic Address: "ABBA, BRADFORD.'

NOTICE: VALUABLE PATENTS FOR SALE.

THE Inventions enumerated below are valuable and worthy of the careful attention of all firms who desire to keep pace with the times with their plant. The Patent Rights are either for Sale outright, or may be worked on Licence, or we will on reasonable terms agree to their being manufactured and supplied by a Company to be formed for that object.

Washer-Scrubber.—The design of a new rotary Washer-Scrubber on the principle of the honeycomb cell. It has a larger scrubbing surface than anything yet produced, and is free from binding friction against the drive. It also embodies many other advantages necessary in a successful Washer-Scrubber.

Primary Cleanser.—A most perfect device arranged so as to arrest the greater part of the heavy impurities in crude gas before being conducted through any other device, thereby lessening the task of such apparatus, and consequently giving it a much longer period of action, and securing more thorough purification.

Note.—We are prepared to supply this Primary Cleanser without direct charge, taking payment by results and savings over an agreed period.

Hydraulic Main Valve.—A simple arrangement in one Valve, by which the seals to dip pipes are regulated as to depth, or removed, and also, when required, acts as a complete stop valve. All these manipulations are made with one movement and with but one moving part.

New Four-Way Valve.—This one Valve is capable of performing the following functions: Reverse motion, bye-pass, and complete double-faced stop, all combined and working with but one moving part. This Valve is applicable to the reversing of any single or combination of apparatus.

Centre Valve.—This Valve enables one to have all his four purifiers in work, and at any time to cut out for changing, and immediately to put into action again. It also, with the addition of one of the above four-way valves, enables one to reverse the whole bed of purifiers, thereby ensuring greater duty from the purifying material.

Retorts.—Something new in Retorts and their charging, which will do away with many of the disadvantages of the present inclined and vertical systems, and which will also include many advantages hitherto unheard of. They save capital expenditure, gas, time, and labour. They are equally adaptable to medium and small, as well as to large works.

Purifiers.—With new methods of revivification, *in situ* and otherwise, new methods of discharging, and also a new grid and grid bar, which secures an increased surface contact, even density, and increased capacity. With the combination of the above a purifier may be put through the whole cycle of operations of changing well within one-tenth part of the time of present practice, and with but a fraction of the labour hitherto required, and then without endangering either life or health. The above systems adapt themselves equally well to Tower Purifiers as advocated by eminent engineers in the United States and in the British Gas Publications of recent dates. With these arrangements we can surpass anything now on the market, for quantity of material in space, extended utility, and working results.

We intend to be in attendance, with models and drawings of the above, at a convenient address near to Earl's Court during the latter part of the Exhibition, and meantime invite all interested parties to communicate with us, as below, when we shall be pleased to arrange an appointment to inspect same with a view to business.

The Priory, Bradford. T. REDMAN & Co.

ARROL-FOULIS
Patent Automatic Machinery
FOR
DRAWING AND CHARGING GAS-RETORTS.

Full Particulars may be obtained from the Sole Makers.

SIR WILLIAM ARROL & CO., Limited,
GLASGOW.

[See Illustrated Advertisement, Dec. 6, p. 806.]

THORIUM NITRATE
AT
LOWER
THAN SYNDICATE PRICES.

UNITED CHEMICAL WORKS,
JULIUS NORDEN & CO.,
94, LEADENHALL STREET, E.C.

CLASMI MANTLES

MADE OF

FINEST RAMIE THREAD

REALLY HIGH GRADE.

Used by all leading Gas Companies, &c.

Send for New List and Prices.

THE BEST HOUSE FOR FITTINGS AND GLASSWARE.
See our STAND, No. 47, at the International Gas Exhibition.

J. & W. B. SMITH,
19 to 23, Farringdon Road,
LONDON, E.C.

INTERNATIONAL GAS EXHIBITION,
AT
STAND 119,
QUEEN'S PALACE,

(PHOTO. OF OUR STAND.)

We Exhibit a comprehensive selection of our Manufactures.

Gas Engineers should inspect in operation the Veritas Automatic Lighter and Extinguisher.

FALK, STADELMANN, & CO., LIMITED,
83, 85, & 87, Farringdon Road,
LONDON, E.C.

SAML. CUTLER & SONS,

MILLWALL, LONDON.

STANDS 75 & 96 at Earl's Court Exhibition.

GASHOLDERS.
STEEL TANKS.
CONDENSERS.
ROOFS.

JÄGER PATENT
PURIFIER GRIDS
CAPACITY OF PURIFIERS DOUBLED.
PRESSURE CONSIDERABLY REDUCED.

CARBURETTED WATER GAS
Maximum Efficiency Guaranteed.
A LARGE NUMBER OF PLANTS IN OPERATION.
See Illustrated Circulars at the Exhibition.

Every Requirement for Gas-Works.
(188.)

"SELAS" LIGHT.

Compressed Air and Gas, Consumption of Gas Reduced to a Minimum.

THE HIGHEST RESULT YET ATTAINED IN GAS LIGHTING.

45 Candles per foot of Gas.

50 PER CENT. SAVING IN GAS CONSUMPTION AS COMPARED WITH THE WELSBACH LIGHT, CANDLE-POWER FOR CANDLE-POWER.

Any Candle Power, from 30-Candles to 2500-Candles, can be obtained with the same amount of economy.

RESULTS GUARANTEED.

TESTIMONIAL. *May 11th*, 1904.

The economy in gas used in the workroom and warehouse, comparing the quarters ending March, 1903, with March, 1904, was as follows:

Gas Account, March, 1903	£12 11 8
" " March, 1904 (Selas)	3 16 3
Saving	£8 15 5

Besides the economy in the gas consumption, the purity and coolness of the atmosphere is even of greater importance. Previously to the installation our people suffered headaches, although the workshops are well ventilated; but under the "Selas" plan, the workpeople have enjoyed better health, and better work is produced. After six months trial of the "Selas" light, we feel sure that its merits will ensure it a permanent success.

We shall be pleased to answer any inquiries, and you are at liberty to publish these results.

(Signed) NICHOLSON & CO., Cloth Proofing Works, ST. ALBANS, HERTS.

ALL INQUIRIES TO BE ADDRESSED—

Messrs. BEVER & WOLF, 46, VICAR LANE, BRADFORD.

Do not fail to visit our STANDS, Nos. 124/137, at the International Gas Exhibition, Earl's Court, W., Nov. 19, to Dec. 17.

Wrought-Iron
TUBES
And Fittings & Accessories.

LAMBERT BROS., WALSALL,
MANUFACTURERS OF
WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM.
BRASS GAS-FITTINGS, GAS-VALVES, STEAM & WATER VALVES, TOOLS, &c., AND OF
WARNER'S PATENT MARKET GAS STAND-PIPE.
LONDON: LAMBETH BRASS & IRON CO., LTD., 91 & 93, SOUTHWARK ST., S.E.

GENERAL HEATING & LIGHTING CO., LTD.,
(MOELLER'S SYSTEM),
26. VICTORIA STREET, LONDON, S.W.

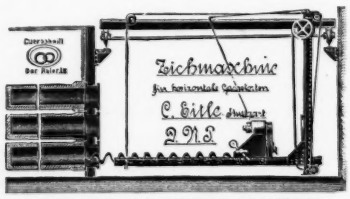
MOELLER'S BURNERS
MAINTENANCE SIMPLIFIED.
Nothing to Corrode. Nothing to Choke.
Nothing to get out of Order.
Made in 4 Sizes consuming 3, 4, 4½, and 6½ feet. In Brass or Nickelled.
PRICE LIST ON APPLICATION.

C. EITLE, ENGINEERING WORKS, STUTTGART.
Telegraphic Address: "EITLE, STUTTGART." Telephone: No. 635.

"KOBOLD" CHARGING APPARATUS.

ADVANTAGES OF THE "KOBOLD" CHARGING APPARATUS.

1.—The simplest of all existing Charging Machines, as in charging there is only ONE shaft working.
2.—Almost indestructible in construction, as there are no combustible parts exposed to the heat of the Retorts.
3.—Uniform bed of coal of any desired height in the retort, and consequently any desired weight of charge may be inserted.
4.—Greater yield of gas in comparison with all other types, owing to the coal being deposited in the retort most advantageously.
5.—Least inrush of cold air owing to the close fit of the charging mouthpiece with the retort mouthpiece, with consequently practically no cooling of the retort, the least outrush of flame and smoke, and therefore smallest loss of gas.
6.—Smallest consumption of power.
7.—Most rapid working, as the complete charging of a retort requires only two pulls of a lever.
8.—May be set at any position in regard to height by either manual or motor power.
9.—Lowest cost to purchase; paying interest and redemption in about three years.



"SCHLANGE" DRAWING MACHINE.

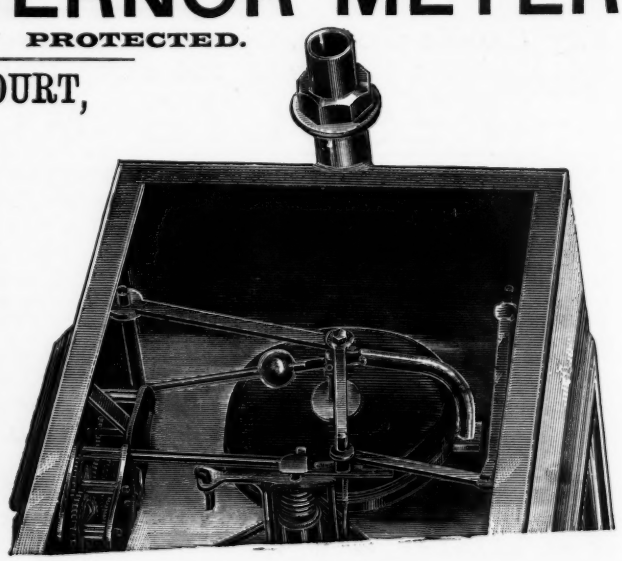
ADVANTAGES OF THE "SCHLANGE" DRAWING MACHINE.

1.—The simplest and best drawing machine in the world for horizontal retorts.
2.—Least time required to draw a retort (10-15 seconds).
3.—Most careful treatment of the lumps of coke, as well as the retort.
4.—Smallest consumption of power.
5.—Lowest cost to purchase.
6.—Most substantial construction, and consequently very low maintenance charges.
7.—Rapid and cheap working, consequently pays interest and redemption in a few years.

MACFIE'S GOVERNOR METER
PROVISIONALLY PROTECTED.

ON EXHIBITION AT EARL'S COURT,
STAND No. 159, Queen's Palace.

The problem of effective control of gas pressure at the measuring point has been greatly simplified by the introduction of this combined Meter and Governor, which can be readily adjusted to any desired pressure, according to varying conditions. The regulation of pressure is effected by the use of a key, which may be operated officially or by the consumer. The **additional cost** of Meters fitted with this self-contained Governor **is only a few Shillings** in the ordinary sized Meters, and this nominal expense removes the usual objection to the fixing of Gas Governors.



JAMES MILNE & SON,
LIMITED,
MILTON HOUSE WORKS, EDINBURGH.
59, Farringdon Rd., LONDON. 34, Wellington St., LEEDS. 111, St. Vincent St., GLASGOW.

HISLOP'S PATENT RETORT SETTINGS.

The very best to adopt for Productive Capacity, Economy of Fuel, Durability, and Simplicity of Management.

R. & G. HISLOP, Gas Engineers and Contractors, PAISLEY, N.B.

LONDON: 11, QUEEN VICTORIA STREET, E.C.

INSTALLATIONS AT THE GAS-WORKS OF—

West Bromwich, Ilford, Tipton, Bilston, Cleethorpes, Rushden and Higham Ferrers, Barking, Ilfracombe, Cape Town, Erfurt, Pfortsheim, Iserlohn, Barmen-Rittershausen, Mülheim a.d. Ruhr, Nürnberg, Plauen, Rome, Lyons, Gijon, Brummen, Osterfeld, Warstein, Wiborg.

HIGHEST EFFICIENCY.
GREATEST ECONOMY.

THE DELLWIK-FLEISCHER WATER GAS PROCESS.
PATENTS IN ALL COUNTRIES.
BLUE WATER GAS, CARBURETTED WATER GAS.

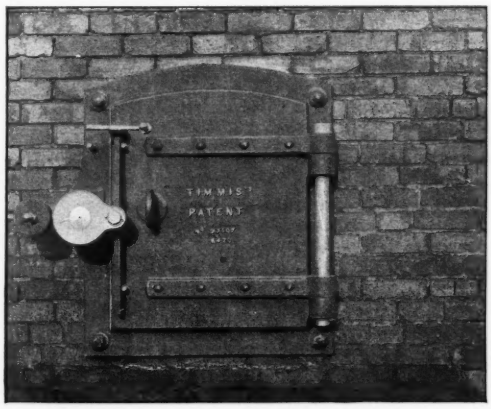
COMBINED WITH
SELF-CARBURETTING
AT

Imperial Continental Gas Association, Mariendorf-Berlin, Königsberg, Remscheid, Ludwigshafen, Güstrow, Salzwedel, Dortmund, Stuttgart, Hanau, Furth (Bavaria), Freiberg (Saxony), Osnabrück, Görlitz, Arnhem, Zutphen, Berne, St. Quentin, Barcelona, Beyrouth (Syria), Trieste.

THE
DELLWIK-FLEISCHER WATER GAS SYNDICATE
25, VICTORIA STREET, WESTMINSTER, LONDON, S.W.

TIMMIS'S PATENT CLINKERING DOOR.

It is a well-known fact that the ordinary Clinkering Door which is fastened only at the middle almost invariably warps with the heat, thereby **admitting primary air in unknown quantities and in the wrong place.** Where two fastenings are used to either single or double doors it is impossible to apply equal pressure with them, and as a rule only one of them is used, the results being worse than with the single fastening. With Timmis's Patent it is impossible to avoid putting equal pressure on both top and bottom, and with the same ease as with the old single fastening.



Advantages.

1. It renders **warping impossible.**
2. **No primary air** can pass into the furnace **between the Door and the Frame.**
3. It is **the only Clinkering Door** that can be **sealed top and bottom by the operation of one fastener.**
4. There are **no complicated parts** to wear or get out of order.
5. **Double Doors** can be **dispensed with.**
6. It occupies **no more room than the ordinary door.**

DESCRIPTION OF DOOR.

TIMMIS'S PATENT CLINKERING DOOR is fastened by means of a vertical bar pivoted in the centre and provided with a screw at the top end. When the screw is tightened, the lower end of the bar is pressed with equal force against the lower corner of the door. **The two corners are therefore subject to equal pressure and warping is impossible.** To release the door the screw is loosened, and the bar, which is balanced by a counter-weight and rotates upon a strong pin attached to the frame, is moved clear of the door. The sketch above shows the position of the bar when the door is closed.

Further Particulars and Prices on Application to the Patentee:

GEO. H. TIMMIS, RIVER STOUR WORKS, STOURBRIDGE.

Telegrams: "TIMMIS, LYE." National Telephone: 13 LYE.

OR OF HARPER & MOORES, LTD., STOURBRIDGE.

THIS TALKS!!!

We have Lighted a Section of Plymouth Docks
for the Great Western Railway Company.

An Extension has been Ordered.

We have completed at Aylesbury an Installation—Town Hall, Market, &c.

The Council has unanimously decided that we be requested to do the whole of the Public Lighting.

We are

50 per cent. Cheaper than Incandescent Gas.
70 ,, Electric Arc.
80 ,, ,, Incandescent.
120 ,, Ordinary Fishtail.

BERLIN, the Finest Lighted City in the World, **has adopted Millennium**

It is the LAST WORD.

THE MILLENNIUM SYSTEM IS A METHOD OF COMPRESSING ORDINARY GAS. . . . .

If you want to get **MORE LIGHT** and **CUT THE COST**, write—

The British Compressed Gas Co., Ld.,

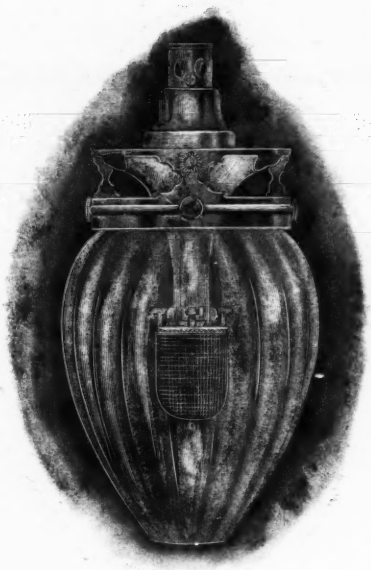
57, BARBICAN, E.C.

THE ORIGINAL NEW INVERTED INCANDESCENT GAS-BURNERS

BRITISH MANUFACTURE.

INCREASED DISCOUNTS TO THE TRADE.

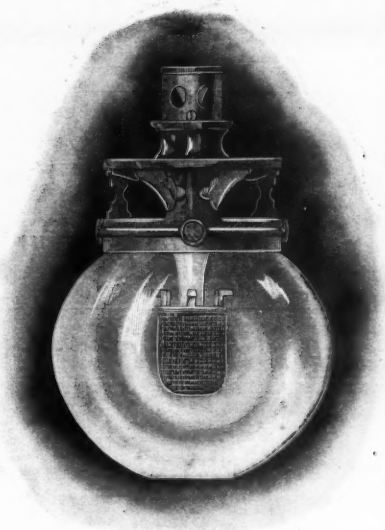
New types of BURNERS at popular Prices.



MAXIMUM LIGHT WITH MINIMUM CONSUMPTION OF GAS.

The "Bijou" Burner in clusters for interior lighting has the decorative effect of Electric light at One-Eighth the cost.

NEW LISTS NOW READY.



No. 2 Burner only, in Polished Brass or Steel Bronze, 4s. 6d. Globes from 6d. each. Mantles 7s. per dozen.

No. 3 Bijou" Burner only, in Polished Brass or Steel Bronze, 3s. Globes from 4d. each. Mantles 6s. 6d. per dozen.

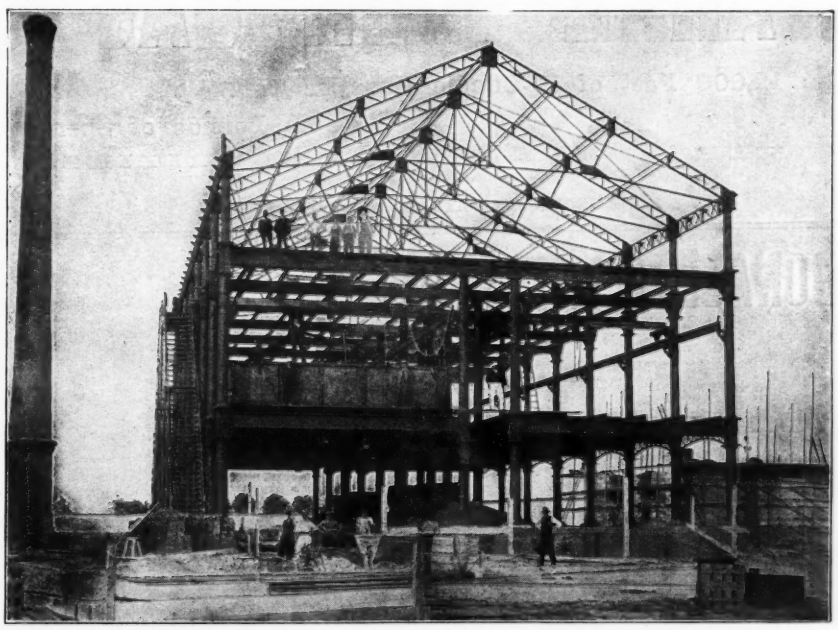
ONLY ADDRESS: THE NEW INVERTED INCANDESCENT GAS LAMP CO., LD.,
23, FARRINGDON AVENUE, E.C.

We are Exhibiting at the International Gas Exhibition, Earl's Court, W., Nov. 19 to Dec. 17, at STAND No. 60. A visit will be esteemed.

THE WHESSOE FOUNDRY CO., LTD.

Works: DARLINGTON.

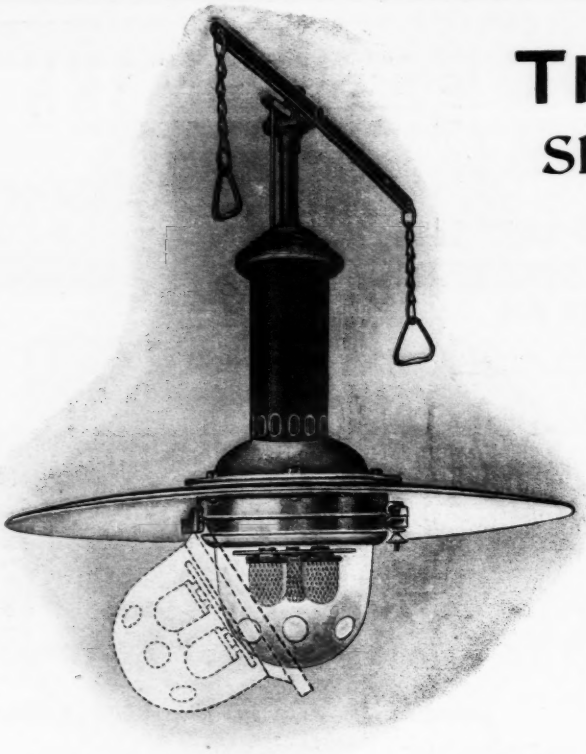
MAKERS OF EVERY DESCRIPTION OF GAS PLANT.



GASHOLDERS AND DRY-SEAL PURIFIERS A SPECIALITY

PHOTO. OF STAGE-FLOOR PURIFIER-HOUSE TAKEN DURING ERECTION FOR THE UNION DES GAZ AT THEIR WORKS NANTERRE, PARIS.

London Office: 106, CANNON STREET, E.C.



The "DRURY"

Shadowless Inverted Cluster Lamp.

PATENTED AND REGISTERED.

A very efficient Lamp for all Buildings where a good downward light is wanted.

The special feature of the "**Drury**" Inverted Cluster Lamp is the way in which a cluster of Three Inverted Mantles is suspended from an interior white enamelled plate. The Three Mantles are arranged so close together that they have the appearance of one large brilliant Incandescent Ball, giving a surprising effect of its lighting power.

The Lamp is provided with a small interior Bye-Pass. Only "**Drury**" Mantles should be used to obtain the best effect, as they have a special Registered Holder which ensures the Mantles keeping a central position.

No. 2203. For Indoor use, 49s. 6d. Complete with Mantles as shown. Extra Mantles, 7s. per dozen.

EVERED & CO., LIMITED,

27 to 35, Drury Lane, London, W.C., & 143, High Street, Shoreditch, E.

Works: SURREY WORKS, SMETHWICK, near BIRMINGHAM.

JOHN BROWN & CO., LTD., SHEFFIELD,

Proprietors of

ALDWARKE MAIN, CAR HOUSE, & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·20.

VERY FREE FROM IMPURITIES.

TELEGRAMS: "ATLAS, SHEFFIELD."

HANNA, DONALD, & WILSON,

(Established 1851),

GAS ENGINEERS & CONTRACTORS,

ABERCORN FOUNDRY AND ABBEY WORKS,

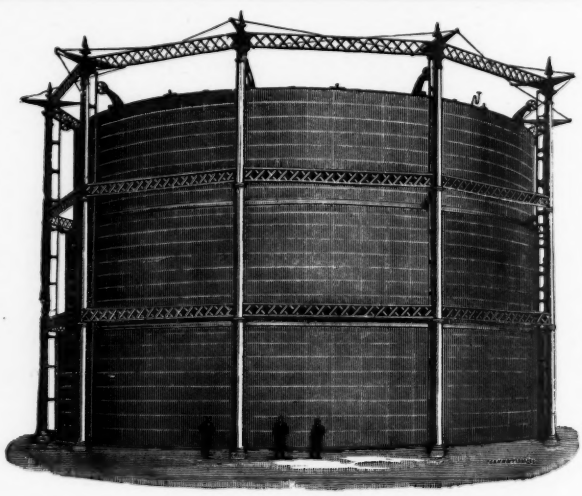
PAISLEY, N.B.,

MAKERS OF

Gasholders & Gas Plant

OF EVERY DESCRIPTION.

Telegraphic Address: "Donald, Paisley."

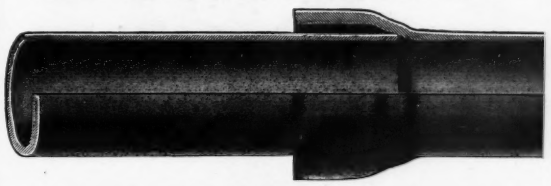


BOWENS' Ltd. Successors,
STOURBRIDGE.

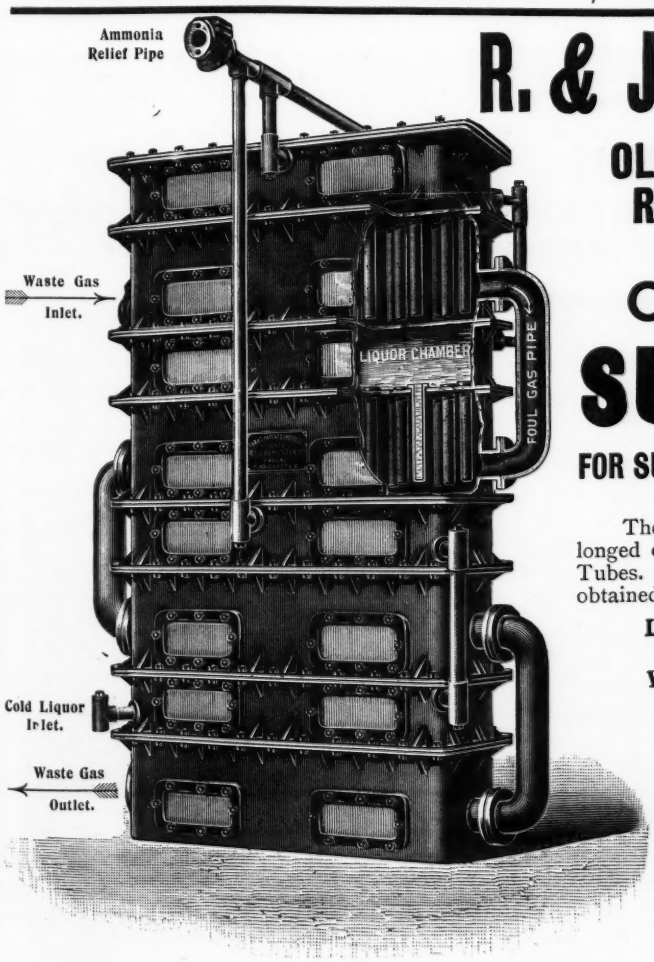
MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.
ESTABLISHED 1860.

CLAYTON SON & Co LTD LEEDS
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD ALSO
THE ORIGINAL MAKERS OF
SPIRAL GUIDED GASHOLDERS
MAKERS OF ALL KINDS OF STRUCTURAL IRON & STEEL WORK. STEEL FRAMED BUILDINGS ROOFS RETORT FITTINGS PURIFIERS RETORT LIDS ANTIFREEZERS for Gasholders
STEEL TANKS
OF ALL SIZES
MAKERS OF THE LARGEST IN
THE WORLD.
GASHOLDERS
OF EVERY DESCRIPTION & SIZE
HIGH CLASS BOILERS FITTED WITH CORRUGATED FLUES.
DEIGHTONS
Telegrams "GAS LEEDS." London Office 60 Queen Victoria St E.C.

MANNESMANN



WELDLESS STEEL SPIGOT AND FAUCET PIPES
In any Length up to 40 feet for
GAS & WATER MAINS.
A PERFECT SUBSTITUTE FOR CAST-IRON MAINS.
— THE —
BRITISH MANNESMANN TUBE Co.,
— LIMITED, —
110, CANNON STREET, LONDON, E.C.



R. & J. DEMPSTER, LTD.,
OLDHAM ROAD, MANCHESTER.

CARR'S PATENT
SUPERHEATER
FOR SULPHATE OF AMMONIA OR OTHER PLANTS.

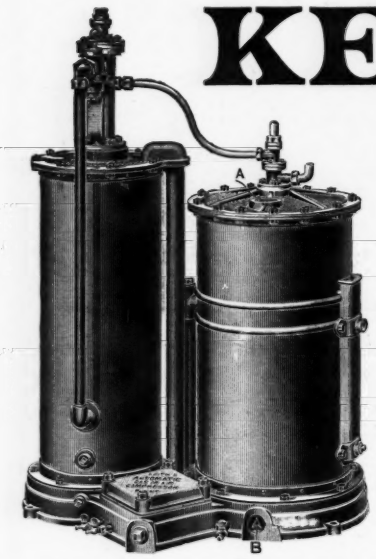
The rectangular shape of this Superheater effects a prolonged contact of the waste heat with the depending Liquor Tubes. In Superheaters at work the following efficiency is obtained:—

Liquor Inlet to Superheater ..	64° F.
„ Inlet to Still	191° F.
Waste Gas Inlet to Superheater ..	205° F.
„ „ Outlet from „ ..	75° F.

STEAM AND FUEL ARE SAVED;
THE CAPACITY OF THE PLANT IS INCREASED;
THE CHEAPEST UNREFINED ACID CAN BE USED;
AND LESS CONDENSING POWER IS REQUIRED.

PRICES AND PARTICULARS ON APPLICATION.

THE KEITH LIGHT



No. 3 Compressor, enclosed pattern. Water Driven.

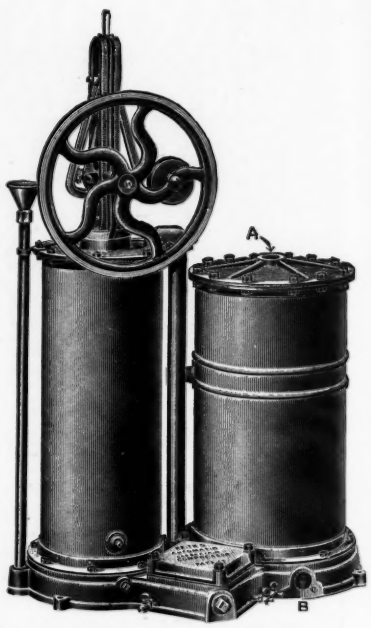
1600 Installations now in use.

Keith's Patent Gas Compressors are perfectly Automatic and require no attention

Non-fluctuating.

Made in various sizes and arranged to give any constant pressure from 2-inch upwards.

DRIVEN BY ANY AVAILABLE POWER.



No. 3 Compressor. ower Driven.

Patentees and Manufacturers—

JAMES KEITH & BLACKMAN CO., LTD.,

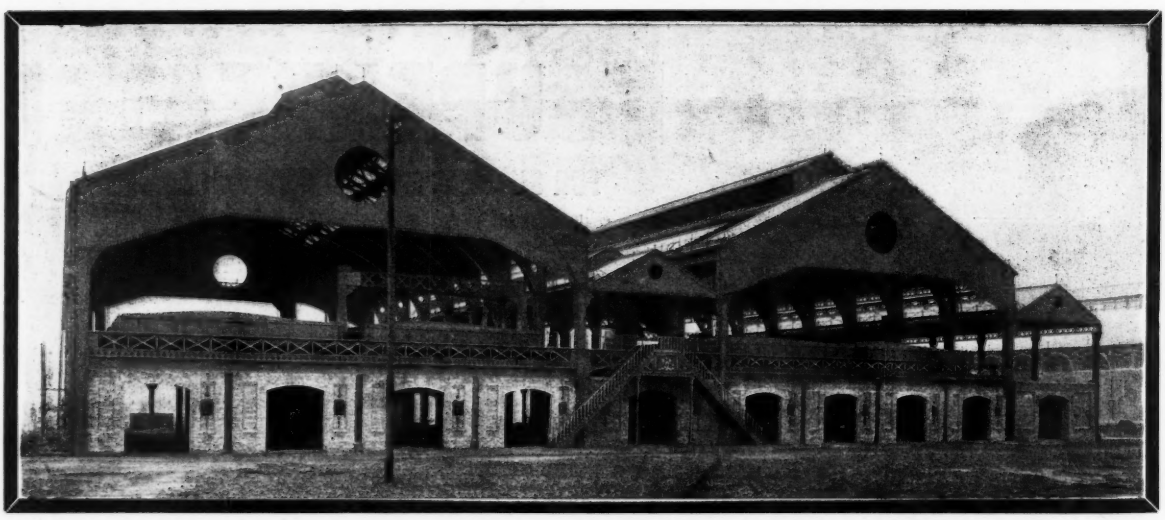
27, FARRINGDON AVENUE, LONDON, E.C.

CLAPHAM BROS., LTD., KEIGHLEY,

SOLE MAKERS OF

THE "ECLIPSE" SPECIALTIES

IN WASHER-SCRUBBER- WATER-TUBE CONDENSERS, AND DRY-LUTE PURIFIERS.



The above is a view of a Purifying Plant entirely undertaken by us, it covers 4444 square yards and contains Twelve Purifiers with space for an additional Four, each 35 feet square, with a total area of 14,700 square feet. Upwards of 2490 Tons of Steel and Iron were used.

London Representatives: **Messrs. JONES & YOUNGER, Chesterfield House, 98, Gt. Tower Street, E.C.**

Scotch Representative: **JOHN D. GIBSON, 74, York Street, Glasgow.**

Printed for WALTER KING, by King, Sell, and Olding, Ltd.; and Published by him at 11, BOLT COURT, FLEET STREET, in the CITY OF LONDON.—Tuesday, Dec. 13, 1904.